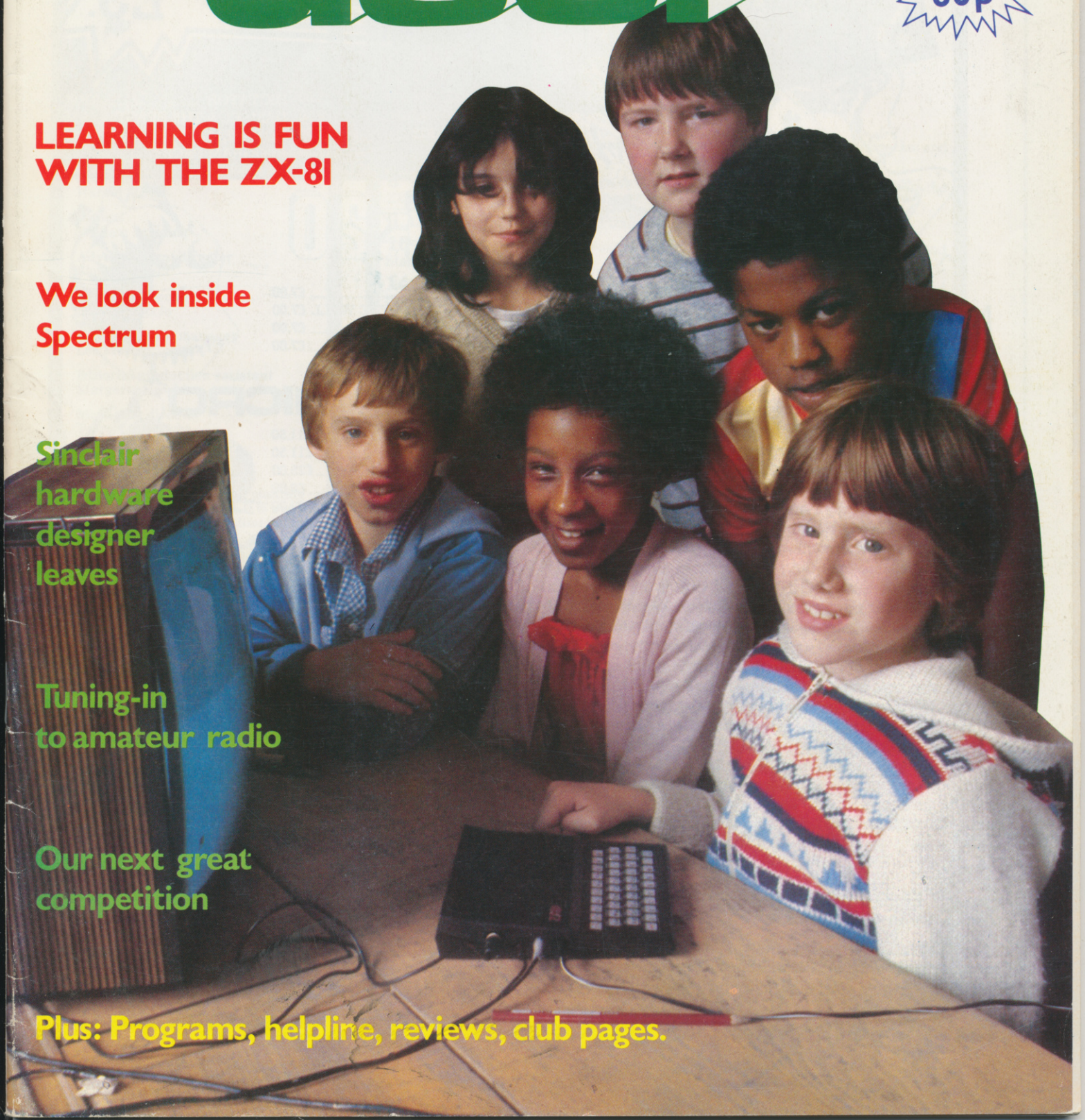
July 1982

The independent magazine for the independent user

sinclair user

Only 60p



LEARNING IS FUN WITH THE ZX-81

We look inside Spectrum

Sinclair hardware designer leaves

Tuning-in to amateur radio

Our next great competition

Plus: Programs, helpline, reviews, club pages.

July 1982

The independent magazine for the independent user

sinclair user

Only 60p

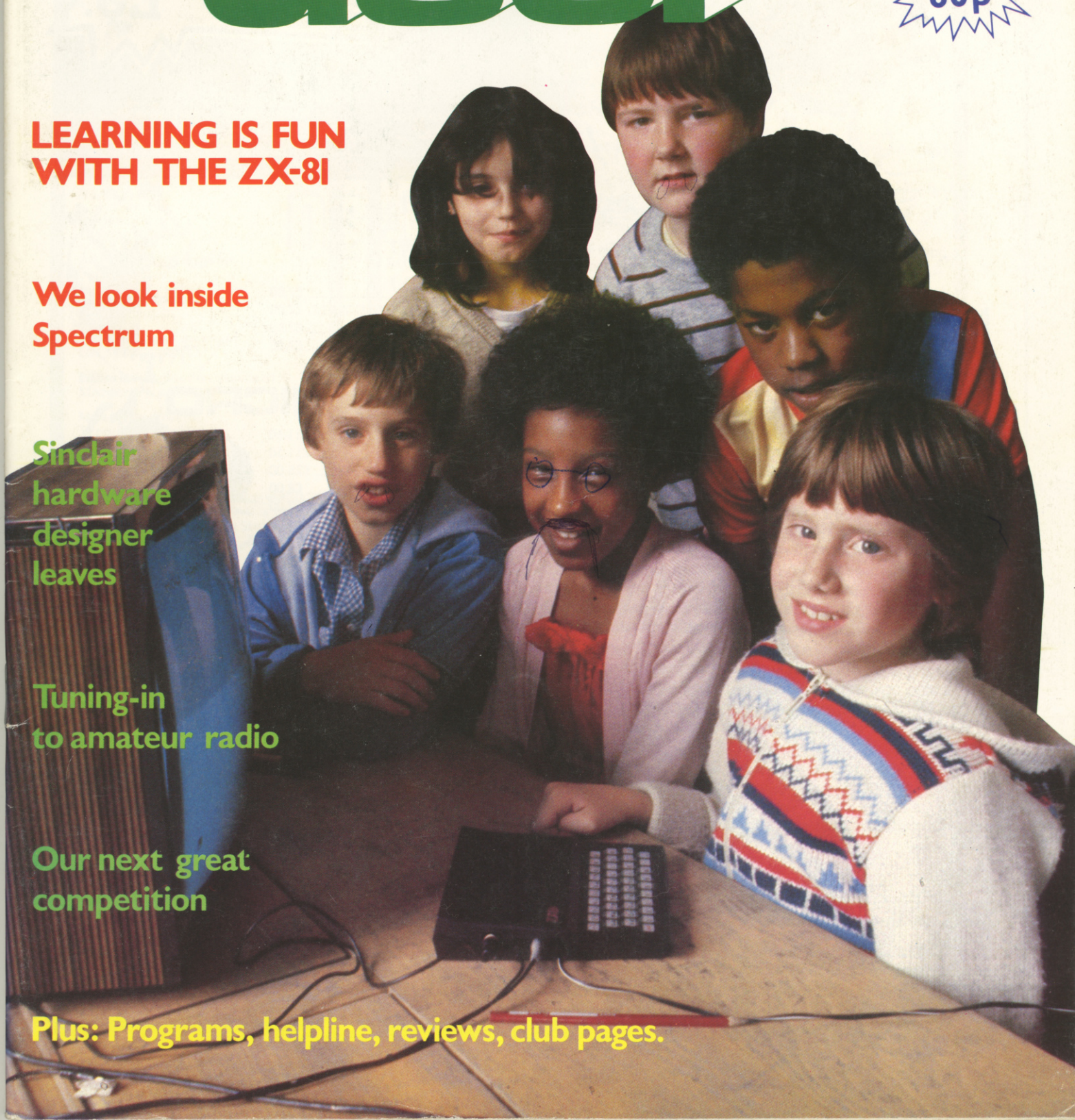
LEARNING IS FUN WITH THE ZX-81

We look inside Spectrum

Sinclair hardware designer leaves

Tuning-in to amateur radio

Our next great competition



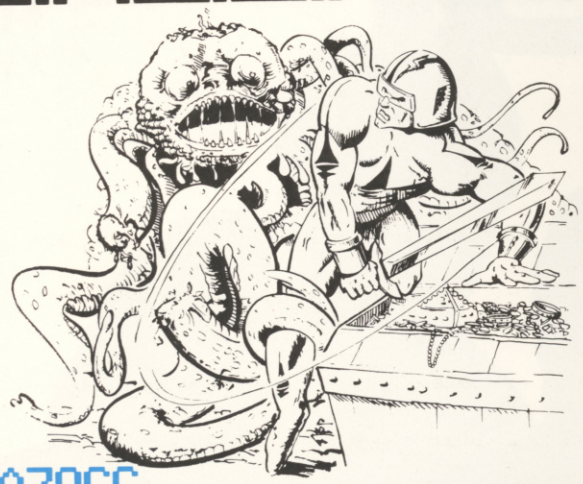
Plus: Programs, helpline, reviews, club pages.

Jeremy Porter

ZX81 ..... B.B.C. MICRO ..... ATOM VIC

MAZOGS ZX81

A MAZE ADVENTURE GAME FOR sinclair ZX81



MAZOGS is a brand new game for the 16K ZX81, unlike any other game you've seen on the ZX81. This is without doubt the best game available for this computer, and if you don't believe us, ask somebody who has seen it, or go down to your local computer shop and ask for a demonstration.

MAZOGS is a maze adventure game with very fast-moving animated graphics. A large proportion of the program is written in machine code to achieve the most amazing graphics you have ever seen on the ZX81.

You will be confronted by a large and complex Maze, which contains somewhere within it a glittering and fabulous Treasure. You not only have the problem of finding the treasure and bringing it out of the maze, you must also face the guardians of the maze in the form of a force of fearful Mazogs. Even if you survive their attacks you could still starve to death if you get hopelessly lost. Fortunately, there are various ways in which you can get help on this dangerous mission.

There are three levels of difficulty, and the game comes complete with comprehensive instructions. The cassette on which the game is supplied is of the highest quality, and loading is guaranteed.

Mazogs is available from Bug-Byte and most good computer shops at £10. inclusive.

INVADERS! £4.

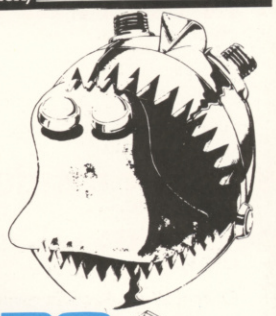
Fast-moving, machine code version of the famous arcade game, for the 16K ZX81. Shields are provided to help protect you from the bombs of the marching aliens. Ten levels of play, from easy to suicidal! On screen scoring.

STARTREK! £5.

The classic computer game in which you trek across the galaxy in search of Klingons to zap with your phasers and photon torpedoes. You have long and short range scanners to help you find them, Starbases to refuel your ship and, of course, various witty comments from the crew.

ZXAS ASSEMBLER	£5.00	DICTATOR	£9.00
ZXDB DEBUGGER	£6.50	DAMSEL & THE BEAST	£6.50
ZXTK TOOLKIT	£6.00	CONSTELLATION	£8.00
MULTIFILE	£17.50	PROGRAM PACKS	
MAZOGS	£10.00	1-8 (each)	£4.00

VIC-20



VICMEN	£7.00
ANOTHER VIC IN THE WALL	£7.00
VICGAMMON	£7.00
ASTEROIDS	£7.00

BBC MICRO

SPACE WARP	£11.50
B.B.C. CHESS	£11.50
B.B.C. MULTIFILE	£25.00
B.B.C. BACKGAMMON	£8.00
B.B.C. GOLF	£7.00

ATOM

INVADERS	£8.00		
CHESS	£9.00	FRUIT MACHINE	£4.00
747 FLIGHT SIMULATION	£8.00	PINBALL	£4.50
GALAXIANS	£8.00	LABYRINTH	£7.00
BREAKOUT	£4.00	LUNAR LANDER	£5.50
		GOLF	£5.00

ALL PRICES INCLUDE POSTAGE

Please send me .....

I enclose cheque/P.O. for .....

OR Please debit my: Access 5224 .....

Barclaycard 4929 ..... Expiry date .....

Name .....

Address .....

..... Code .....

Dealers Discount Available

ACCESS, BARCLAYCARD ORDERS WELCOME ON 24hr. ANSAPHONE 051-227 2642, or mail to:

SU-7-82

BUG-BYTE SOFTWARE, FREEPOST, (No stamp req.) LIVERPOOL L3 3AB.

VISA

BUG-BYTE SOFTWARE

100 The Albany, Old Hall Street, Liverpool L3 9EP

ZX81 ..... B.B.C. MICRO ..... ATOM VIC

contents

sinclair user

Editor
Nigel Clark

Consultant editor
Mike Johnston

Production editor
Harold Mayes

Design
William Scolding

Advertisement director
Simon Horgan

Editorial director
John Sterlicchi

Advertisement manager
Les Morton

Editorial/production assistant
Margaret Hawkins

Managing director
Terry Cartwright

Chairman
Richard Hease

Sinclair User is published monthly by ECC Publications Ltd. It is not in anyway connected with Sinclair Research Ltd.

Telephone
All departments
01-359 7481

If you would like to contribute to Sinclair User, please send typed (or beautifully-handwritten) articles or programs to:
Sinclair User
ECC Publications,
30-31 Islington Green,
London N1 8BJ

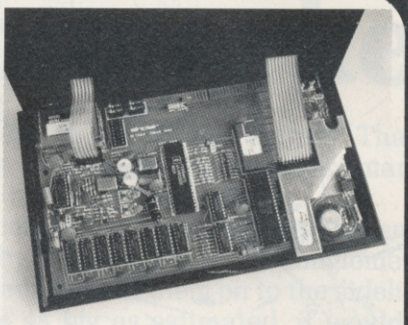
We will pay £10 for each program printed and £50 for each article, which should be approximately 1,000 words long.

©Copyright 1982

Sinclair User
ISSN No. 0262-5458
Origination at
Outline Graphics.
Printed by
Eden Fisher (Southend) Ltd

Distributed by
Spotlight Magazine Distribution Ltd,
1 Benwell Road,
Holloway,
London N7
01-607 6411

page 6



page 14

5 SINCLAIRVOYANCE We consider the future for retailing in the Sinclair market and its effect on suppliers.

6 SCHOOLS SPOT A teacher, Dave Sayers, writes about his experiences using the ZX-81 in his school.

9 LETTERS More brickbats and bouquets from our readers.

10 SINCLAIR USER CLUB As our special club gets under way, we offer our second Star Bargain to club members.

14 SPECTRUM REVIEW Stephens Adams looks inside the new Sinclair machine and likes what he sees.

19 NEWS W H Smith's future plans, ZX shows around the country, and the sponsorship of the Cambridge half-marathon.

22 AMATEUR RADIO Julian Moss looks at the uses of the ZX-81 in radio shacks.

25 NEW USERS Last month, Nicole Segre told the story of the mother's lament of her son's new computer. This month she tells how she fought back.

28 READER SURVEY We ask you to tell us what you think of *Sinclair User* and the market for Sinclair products and spin-offs.

31 PROGRAM PRINTOUT Another eight pages of special programs, with one for the ZX-80.

41 PROGRAM AIDS Phil Garrett looks at dissassemblers and assemblers which are on the market.

45 SOFTWARE SCENE We look at the new programs.

47 HARDWARE WORLD More of the new items in the hardware market are reviewed.

52 NEW BUSINESS Richard Altwasser and Steven Vickers, two of the leading figures in the design of the Spectrum, have launched their own company.

56 HELPLINE Andrew Hewson and more of the problems which people find in using their Sinclair machines.

59 MIND GAMES Philip Joy examines a game of chess which can fit into 1K.

62 MACHINE CODE The final part of the series by Mike Biddell on machine code programming.

64 COMPETITION Following the success of our previous competitions, we offer another printer and the Memopak 64K RAM pack as prizes this month. .

65 ADVERTISEMENT INDEX Your guide to the many items on offer in the pages of *Sinclair User*.

NEXT MONTH

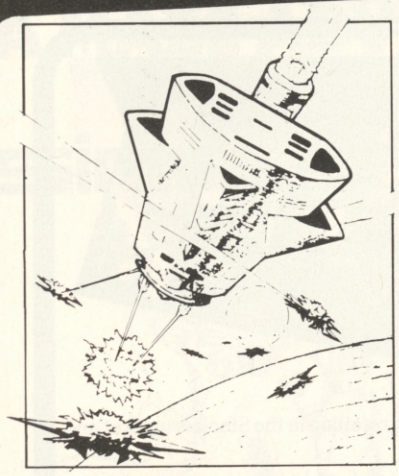
- **We assess Sinclair's new range of educational software**
- **More of your queries answered in Helpline**
- **ANOTHER GREAT OFFER TO SINCLAIR CLUB MEMBERS**

LEADERS IN COMPUTER GAMES

FIRST CHOICE FOR ZX: SUPPORT:

ZX-81

ZX-80

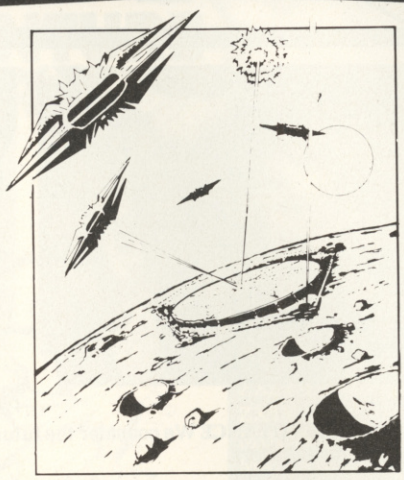


QS DEFENDER.
UP – DOWN – THRUST – FIRE
First and only full screen display. Software to drive QS SOUND BD. Moving Planetary surface. Up to 84 fast moving characters on screen at once. On screen scoring. Ten missiles at once. Increasing attack patterns. Requires 8K ROM, and 4K min of RAM. **£5.50.**

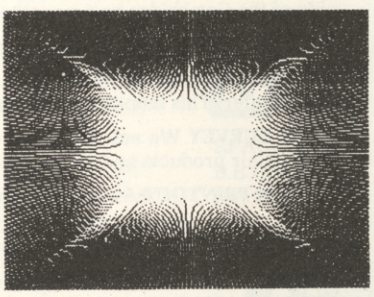
QS SOUND BD.
A programmable sound effects board using the AY-3-8910. 3 TONES; 1 NOISE; ENVELOPE SHAPER: + TWO 8 BIT I/O PORTS. Easily programmable from BASIC, the AY chip does most of the work leaving your computer free for other things. Signal O/P via 3.5 mm Jack socket Ports O/P via a 16 pin I.C. Socket. **£26.00.**

QS CHRS BD./
A programmable character generator giving – 128 SEPARATELY PROGRAMMABLE CHARACTERS. ON/OFF SWITCH. 1K ON BOARD RAM. Enables creation and display of your own characters to screen or printer. Demo cassette of fast machine code operation routines and lower case alphabet included. See below for ZX PRINTER listing. **£26.00.**

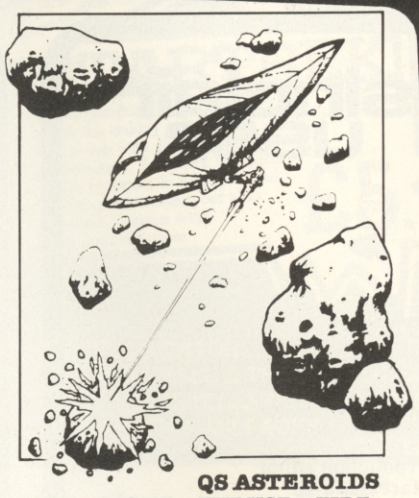
QS - LOWER CASE
a b c d e f g h i j k l m n o p q r s t u v w x y z



QS INVADERS.
LEFT – RIGHT – FIRE
13×7 INVADERS; High score; 3 levels of play; RND saucers; Bonus base; Drives Sound bd. & CHRS bd. Requires 7K RAM, 8K ROM + Slow. **£5.50.**



QS HI-RES BD.
A Hi-res graphics board giving – 256×192 PIXELS. 6K ON BD. RAM. SOFTWARE SELECT/DESELECT. MIXED TEXT AND GRAPHICS. 2K ON BOARD ROM. Resident fast machine code graphics software (in ROM) provides the following HI-RES Commands. – MOVE x, y; PLOT x, y; DRAW x, y; BOX x, y; UP; DOWN; LEFT; RIGHT; PRINT A$; SCROLL; BLACK; WHITE CLEAR COPY. See above for ZX PRINTER listings using COPY. **£85.00.**



QS ASTEROIDS
LEFT – RIGHT – THRUST – FIRE
Software to drive QS SOUND BD. Multiple missiles firing in 8 directions. On screen scoring. Increasing number of asteroids. Full mobility of ship to all areas of the screen. Two asteroid sizes. Bonus ship at 10,000 points. Requires 8K ROM, 4K min of RAM + SLOW function. **£5.50.**

QS 3K RAM Bd.
An extremely reliable static RAM Bd. which combines with the computer's memory to give 4K total. Plugs direct in to the rear port on your ZX Computer. **£15.00.**

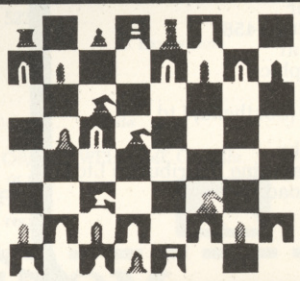
QS MOTHER BOARD BD. & QS CONNECTOR.
A reliable expansion system allowing a total of any RAM pack plus two other plug in boards to be in use at once. On board 5V regulator drives all external boards. Fitted with two 23 way double sided edge connectors. Connector is 2×23 way edge conns soldered back to back. Expansion can operate in two ways – (1) COMPUTER ↔ CONNECTOR ↔ Any QS add on bd. (but no extra RAM pack). (2) COMPUTER ↔ CONNECTOR ↔ MOTHER BD ↔ ANY RAM PACK. (2 bds to fit in mother bd.) Mother board **£12.00** Connector **£4.00.**

Special offers & news

(1) QS PRINTERFACE Connects a ZX Printer to an Acorn Atom. Simple, easy to use, gives listings, commands and Hi-Res screen dump. On board 2K ROM. **£25.00**

(2) QS HARMONY A machine code programme for the QS sound board, gives you easy control of phasing, chorus, tempo, volume, pitch. Complete with sample programme to play the serenade from Mozart's Don Giovanni. ZX81, 4K RAM. **£4.50**

(3) QS Mother bd. + connector + CHRS bd. + The special Graphics version of **ARCTIC COMPUTING'S ZX CHESS 11. £45.00.**
The strongest chess program with 7 levels of play.



POSTAL AND MONEY ORDERS TO: ALL PRODUCTS FULLY GUARANTED.

QUICKSILVA: 95, UPPER BROWNHILL RD. : MAYBUSH : SOTON : HANTS : ENGLAND.

Please state Type of machine, Which ROM, Memory size, when ordering.

Tempting gap in market

IF ANYONE questioned the size of the possible market for home computers, they should take note of the experience of W H Smith. The company sells more magazines on computers than it does women's magazines. There are three computer publications which sell more copies than the most popular women's magazine.

This explains why Smiths is expanding that side of its retailing steadily. As the company puts it, most of its sales are in "maturing markets", so the need to find new and dynamic lines is essential for its future.

The growth potential is phenomenal. It is estimated that, despite sales of almost 500,000 ZX-81s, Sinclair Research has tapped only about two percent of the estimated home computer market. Despite allowing for the fact that it is difficult to assess a market which did not exist two years ago, there is still an enormous hole in the market.

Smith's reaction in the medium term is to try to cover the whole market for both hardware and software. In the long term, it is thinking of specialising on one sector, probably software. That ensures that the route future development will follow is much the same as that for the music market — few people these days expect to be able to buy records in the same place as they buy their music systems.

Follow the route a little further and you begin talking about computer systems designed for home use. One vision of the future, suggested by W H Smith, is that people start by buying some kind of simple keyboard which, in basic form, could be used as a typewriter or calculator. To this could be added various types of processor, memory and printer, to build a personal system to suit a variety of requirements.

Such thinking is perfectly logical and likely to happen, since it sounds very like the way in which Sony developed the music market. Before Sony split music centres into various parts, most people listened to their music on record players built as one unit. Such a thought prompts the question as to what the Japanese are doing about the home computer market.

It would be comforting to think that the lead which Sinclair Research and other British companies have in the field would be an advantage but such leads have been no insurance in the past and are unlikely to be in the future. That is especially true of the home computer market, where changes can happen so quickly.

The British companies involved are also small. One big push by a large Japanese conglomerate could be sufficient to push them on to the sidelines. If the market is as big as estimated, it would not even be necessary to launch a particularly innovative product model.

It would be pleasant to think it would be a British company which takes the plunge.

THERE IS possibly something to be said for the ponderous decision structures of many of Britain's major companies. With the limitation of personal initiative and the promotion of company spirit, the wish to leave and start a new business is severely curtailed.

Compare that to Clive Sinclair's companies, past and present, where initiative and freedom of thought have been encouraged. It is one of the benefits of being a small company that it is possible and it has been used, by Sinclair Research especially, to put new ideas into practice quickly.

The freedom, however, is not total. In the end it is Clive Sinclair who takes the important decisions. Having tasted some easing of constraints, it can be very frustrating when there is still some limitation to action.

It was that frustration which led to the departure of Richard Altwasser to join a growing band of former Sinclair colleagues from whom he now faces some form of competition.

The people behind Acorn Computers and the Grundy Newbrain, which finally was launched last month, all worked with Sinclair at some stage. Altwasser and his partner, Steven Vickers, are keeping quiet about their plans but it is unlikely they will be straying far from the microcomputer field they know so well.

Whether their new company will be big enough to consider launching a new computer is open to conjecture. Leaving that aside for the moment, there is still a large market in software and hardware peripherals where they could compete with their former employer.

Simplicity is best learning pattern

Dave Sayers relates how the ZX-81 has helped learning in his school.

THE POWER of a micro as a learning tool is often quoted in papers and magazines, yet most of the published programs are games and adventures — and good they are, too. Nonetheless, it is a pity that more educational games are not published; the little ZX-81 with even a basic 1K memory can be used to teach many of the fundamentals of mathematics or, with more memory, English.

The example programs included in this article, therefore, are all written within 1K. The reason is simple. To be good, a teaching game need not be complicated. Preferably it should teach only one thing, though that is not to say that mixtures of approaches are not desirable.

It should also, if possible, have a graphics display to help keep the attention of the child. Another good reason for keeping games simple is that many ZX owners, or owners of other machines, are young people like myself who have children at school. With the ZX available, it would be a waste if it were not used constructively to further a child's education.

'The little ZX-81 with even a basic 1K memory can be used to teach the fundamentals of mathematics mathematics'

Initially most people probably write programs of the $6 \times 5 = ?$ variety. They are useful but not especially interesting. Try the program in figure one.

It is very simple; the program prints out 10 rows of graphics squares, with the number of squares printed at the end. It can be used to help to teach children who can count who have difficulty in associating those numbers with the written number — for instance, seven.

As you can see, I am starting at the very first basis of counting. My daughter has started learning to write, or record, numbers greater than 10, and this kind of game can be a great help. A program I have used flashes rows of squares for her to input the number — figure two. It was written specifically to help her understand the way in which numbers above 10 are recorded. The same program, of course, can be adapted easily to give help with numbers above 20.

Although the programs may appear limited, they are still giving valuable practice in learning skills which, if not understood fully, can lead later to difficulty in comprehending, for instance, the value attached to a carried 1 — in 9 + 9 we "carry one" which is really 10. You may say that is well known but rest assured there are plenty of children who find the true value of a carried figure a total mystery.

Computer-aided learning can give those children valuable lessons, for they will know immediately if they are correct or incorrect. In classes where books are marked once a lesson, the incorrectness of what they have done may become apparent only at the end of the lesson — or next day.

Once we have the child understanding counting to a certain total, speed practice becomes important in helping the child to rely less on physical cues of number and begins to depend on their internal memory of where they are in the count. The games should show varying numbers of shapes quickly on the screen, for which a running total has to be kept by the child, to be entered at the end of the run.

HISSING SID is an example of such a program. Snakes appear on the screen, varying numbers each time. A total is input at the end, which is checked — figure three.

There is plenty of fun while learning to count with this program, especially if it is altered to print the total at the end, after a short pause, to give children a chance to shout the answers. They love to see who can be first with the correct answer. Figure four shows how to do this.

This program can be altered in both speed of display and numbers of snakes. For larger numbers alter line 20 and for less time between displays alter line 100. If you make it long enough and quick enough it becomes fairly testing, even for adults.

I wrote a similar program on the Pet at school and tried it on my own class, as well as the class of a colleague.

My class, by now fairly blase where micros are concerned — some of them prefer me to use the ZX their fathers or brothers own one and they can crib my programs — enjoyed it a great deal. The colleague, who was interested in

what the computer could do, was surprised by the way in which some of the less-motivated children were captivated by the game. She was particularly impressed with the way in which one boy, who was finding addition a trial, began to store the numbers in his head; then, staring into space for a minute or so, as he totalled them, he finally delivered his answer in a very positive way.

Gone were the uncertainties he had about written sums, when he would often be at the teacher's desk complaining that he could not understand. Replacing it was the desire to beat the computer, to have his answer before it flashed on the screen.

BRIDGES is a game in which the children attempt to build a bridge by answering addition questions correctly. Each correct answer puts another span on the bridge. As before, they are adding blocks, rather than numbers — figure five.

When the game is run, blocks, in two rows, appear on the screen. If they are added correctly, a span is added to the bridge. If they are not added correctly, there is no penalty; the problem resumes again and again until it is solved correctly.

That is important, as there is no worry that the child will feel he or she has failed on the first few attempts if the bridge is not nearing completion.

Those with 16 or more K of memory might like to improve this program. For instance, the bridge may fill the whole screen and every time there is an incorrect answer a man might walk along the bridge and fall off, to land in a boat, from where he is returned to the bridge to climb and try again. Whether you use these ideas or not, it is important to pay careful attention to what you want your program to teach and never to take for granted the idea that children understand the logic of mathematics.

Figure 1.

```
 10 FOR I=1 TO 10
 20 FOR J=1 TO I
 30 PRINT "▒ ";
 40 NEXT J
 50 PRINT I
 60 PRINT
 70 NEXT I
```

Figure 2.

```
 10 LET A=(INT (RND*10)+10)
 20 CLS
 30 FOR I=1 TO A
 40 PRINT "■ ";
 50 NEXT I
 55 PRINT
 60 INPUT B
 70 IF A=B THEN GOTO 10
 80 PRINT "WRONG , IT WAS ";A
 90 FOR I=1 TO 100
100 NEXT I
110 CLS
120 GOTO 10
```

Figure 3.

```
  5 CLS
 10 LET C=0
 20 LET A=(INT (RND*5)+1)
 30 FOR I=1 TO A
 40 LET B=(INT (RND*6)+1)
 50 LET C=C+B
 60 FOR J=1 TO B
 70 PRINT "(3 SPACES)-▒▒▒
```

Explore the Excellence of your ZX81

With MEMOTECH Add-Ons

High Resolution Graphics

NEW

MEMOTECH ADD-ON £52·00 plus VAT

- Fully programmable high resolution (192×248 pixels).
- Video page is both memory and bit mapped.
- Video page can be located anywhere in the RAM.
- The number of video pages is limited only by your RAM size (each page occupies about 6.5K RAM) and pages can overlap.
- Instant inverse video.
- Switching inverse video on and off gives flashing characters/numerals etc.
- Video pages can be superimposed by software switching.
- Access to video page is similar to plot and unplot commands in BASIC.

The pack comes in an elegant aluminium case, anodised black and styled to fit onto the back of the ZX81, allowing more add-ons (Memopak RAM, Sinclair printer, etc) to be connected without a further power supply. It contains a 2K EPROM monitor, holding a full range of graphics subroutines which can be called by the BASIC USR function or by machine code.

Unique 3 month trade-in offer!

For your future needs, we'll allow you £10 against your purchase of our 64K model if:

you return your 16K pack within 3 months of receipt;

you supply evidence of purchase;

your 16K model is received by us undamaged and unopened.*

**We reserve the right to reject, for discounting purposes, units which have been either opened or damaged in any way.*

MEMOTECH ADD-ON £26·00 plus VAT

Memopak 16K Memory Extension

It is a fact that the ZX81 has revolutionised home computing and coupled with the new Memopak 16K it gives you a massive 16K of Directly Addressable RAM, which is neither switched nor paged. With the addition of the Memopak 16K your ZX81's enlarged memory capacity will enable it to execute longer and more sophisticated programs, and to hold an extended database.

The 16K and 64K Memopaks come in attractive custom-designed and engineered cases which fit snugly on to the back of the ZX81 giving firm, wobble-free connections.

MEMOTECH ADD-ON £68·70 plus VAT

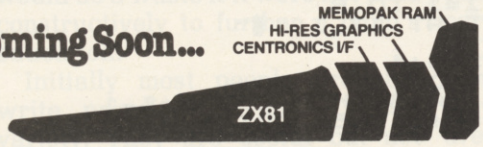
Memopak 64K Memory Extension

The 64K Memopak is a pack which extends the memory of the ZX81 by a further 56K, and together with the ZX81 gives a full 64K, which is neither switched nor paged, and is directly addressable. The unit is user transparent and accepts BASIC commands such as 10 DIM A(9000).

BREAKDOWN OF MEMORY AREAS

0–8K . . . Sinclair ROM **8–16K** . . . This section of memory switches in or out in 4K blocks to leave space for memory mapping, holds its contents during cassette loads, allows communication between programmes, and can be used to run assembly language routines. **16–32K** . . . This area can be used for BASIC programmes and assembly language routines. **32–64K** . . . 32K of RAM memory for BASIC variables and large arrays. With the Memopak 64K extension the ZX81 is transformed into a powerful computer, suitable for business, leisure and educational use, at a fraction of the cost of comparable systems.

Coming Soon...



A complete range of ZX81 plug-in peripherals

Centronics Interface & Software Drivers

Digitising Tablet **RS232 Interface**

We regret we are as yet unable to accept orders or enquiries concerning the above products, but we'll let you know as soon as they become available.

Please make cheques payable to MEMOTECH Ltd.

Please Debit my Access/Barclaycard* account number

Please send me	Price	No	Total
16K RAM @ £26.00 + £3.90 VAT	£29.90		
64K RAM @ £68.69 + £10.31 VAT	£79.00		
HRG @ £52.00 + £7.80 VAT	£59.80		
Packaging & Postage @ £2.00 per unit			
		TOTAL ENC	

**Please delete whichever does not apply*

SIGNATURE _____ DATE _____

NAME _____ ADDRESS _____

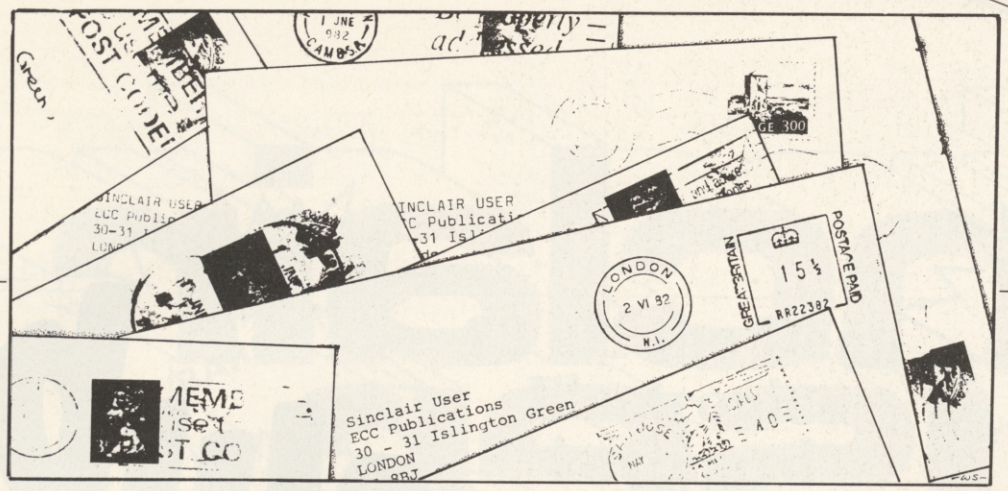
_____ TELEPHONE _____

Access Barclaycard Holders Please Tel. Oxford (0865) 722102 (24 Hrs)

© R. Branton & G.A.C. Boyd 1982

We want to be sure you are satisfied with your Memopak – so we offer a 14-day money back Guarantee on all our products.

Memotech Limited, 3 Collins Street, Oxford OX4 1XL, England Tel: Oxford (0865) 722102 Telex: 837220 Orchid G



Memory wobbles

MUCH has been written on the subject of RAM pack wobble, little of it giving any sound advice as to how it may be prevented. I feel that the three solutions which I have found are the best to date.

The Sinclair RAM would be as good as any other, except for the fact that it does not appear to be very eager to stay on the computer and will jump off when any key is touched hard enough.

If you have £2 to spare, you can buy a ribbon cable and solder one end to the RAM and plug the other to the edge connector of the PCB. That means that when you hit a key too hard, all that happens is that the ribbon cable absorbs the shock.

The second method is simpler and cheaper and just as effective. All that you do is to take a piece of Blutack and place it on the RAM, above the edge connector. When you plug in the RAM it is held to the computer by the Blutack.

The third way to stop RAM wobble, however, does not concern the Sinclair RAM but the Byg Byte RAM. Initially there is nothing wrong with the RAM and it is a very good alternative to the Sinclair RAM but the case is about three times the size it should be and so it pulls the connections apart. The answer is simple — just remove the case.

Giles Colborne,
Galampton,
Devon.

Stopping whiteouts

I WAS very interested in your article on the ZX-81 16K RAM pack, in particular the part which stated that the computer can suffer from whiteouts due to the fluctuations in the mains supply.

I have found that to be an annoying problem, especially when loading a program which takes more than four minutes to run.

I have heard that is due to the voltage spikes in the grid over-loading the memory and re-setting it to the input mode, leaving the mode K on my screen, which has happened to me.

I know that this is the problem, as the same tape and equipment will record perfectly during the times when the grid system is not being used a great deal; i.e., before 8.30 am and between 2 pm and 4.30 pm. It is not always convenient or possible to work on my computer at those times; mostly I like to work in the evenings, which can be the worst time for the problem.

I know that you can obtain a filter unit which goes between the wall socket and the computer plug which will suppress the spikes but I do not know which type would be best for my ZX-81.

Could you advise me as to which method of solving the problem you would suggest and where the goods can be obtained?

Paul Coker,
London SE19.

●*Can readers help? We are sending it to our Helpline correspondent, Andrew Hewson, to see if he knows the answer.*

Apple threat

I AM very grateful for the April issue of *Sinclair User* but it does not tell me how to make my printer work. The books which are sold do not tell you, either. It would be much better if you told people how a ZX-81 works, otherwise I shall have to sell mine and buy an Apple.

I write and write again to Sinclair, without even an acknowledgment.

Maurice Nadin,
Surrey.

●*We hope later issues have been more help and that you have not been compelled to take the drastic step of buying an Apple.*

Changing to machine code

CONGRATULATIONS on an excellent magazine. It is just what ZX users wanted. I am not a programmer and prior to buying my ZX I did not have a clue. Through practice, I am rapidly picking-up the techniques and find the hobby very interesting. I find, having bought some programs written in machine code, that they are eminently superior to anything I have written, or purchased, written in Basic. To you, that may be an obvious statement but it has become clear to me only on running them.

What I would like to do is to understand machine code — of which I now understand the basic principles — and, if possible, to buy a program which could convert some of my many Basic programs into machine code. Is that possible?

From your advertisements there are one or two firms offering products which look as if they may answer the problem — Control Technology, Bug Byte, to name two — but they do not give sufficient detail for me to decide.

I am told that what I am really looking for is a Compiler but I have not yet seen anything advertised as such. Does one exist? Can you recommend any good books or a contact with whom to discuss the matter?

D R Wall,
Manchester.

●*Do readers have any advice? Meanwhile, we have passed the query to Andrew Hewson, our Helpline correspondent.*

●Letters should be kept as brief as possible and addressed to The Editor, *Sinclair User*, 30-31 Islington Green, London N18BJ. Space considerations mean that it may be necessary to edit long letters.

The Sinclair User Club

AS A FURTHER service to users of Sinclair computers, *Sinclair User* is starting the Sinclair User Club.

Membership will cost £12, which will enable members to enjoy a large number of extra benefits. They will include a bi-monthly cassette-based newsletter containing programs and answering problems, and many special discounts on a variety of goods of interest to ZX owners.

Sinclair User will also contain stories about the club and its activities in each issue.

It is intended to build-up the number of items which will be available at special prices to club members, with a Star Offer each month.

Readers wishing to share the benefits of membership of the Sinclair User Club should complete the form below.

MEMBERSHIP FORM

I wish to join the Sinclair User Club and enclose my subscription of £12

Name .....

Address .....

.....

Send your coupons to Sinclair User Club, ECC Publications, 30-31 Islington Green, London N1 8BJ. Cheques should be made payable to Sinclair User Club.

STAR BARGAIN

EXCLUSIVE TO MEMBERS

£3 off the Dean Electronics keyboard

For this month's bargain, open only to members of the Sinclair User Club, we are offering to reduce the price of what many people consider to be the best keyboard available for the ZX-81, the Dean Electronics keyboard.

It is simple to fit, plugging straight into the ZX-81 after the built-in keyboard has been unplugged. It has 47 keys, six more than the ZX-81. The extra keys can be used for whatever the owner wishes.

The normal price is £35 but we are able to offer the keyboard through Buffer Micro Shop for only £32. In addition, the case, which usually costs £14.50, is offered at £13.50.

Membership cards must be shown or numbers must be quoted when taking advantage of the offer, which closes on July 31.

Buffer Micro Shop is at 374A Streatham High Road, London SW16, next to Streatham Station.

Each month *Sinclair User* will be listing, free, the growing number of ZX user groups throughout the world.

We hope the list will be comprehensive and if anyone is forming a new group or knows of one we have not included, please let us know.

Britain

Aylesbury ZX Computer Club: Ken Knight, 22 Mount Street Aylesbury (5181 or 630867). Meetings: first Wednesday and third Thursday of the month.

Edinburgh ZX Users' Club: J. Palmer (031 661 3183) or K Mitchell (031 334 8483). Meetings: second Wednesday of the month at Claremont Hotel.

EZUG-Educational ZX-80/81 Users' Group: Eric Deeson, Highgate School, Birmingham B12 9DS.

Glasgow ZX-80/81 Users' Club: Ian Watt, 107 Greenwood Road, Clarkston, Glasgow G76 7LW (041 638 1241). Meetings: second and fourth monday of each month.

Hassocks ZX Micro User Club, Sussex: Paul King (Hassocks 4530).

Inverclyde ZX-81 Users' Club: Robert Watt, 9 St. John's Road, Gourock, Renfrewshire, PA19 1PL (Gourock 39967). Meetings: Every other week on Monday at Greenock Society of the Deaf, Kelly Street, Greenock.

National ZX-80 and ZX81 Users' Club: 44-46 Earls Court Road, London W8 6EJ.

North Hertfordshire Home Computer Club: R Crutchfield, 2 Durham Road, Stevenage; Meetings: first Friday of the month at the Settlement, Nevells Road, Letchworth.

North London Hobby Computer Club: ZX users' group meets at North London Polytechnic, Holloway Road, London N7 each Monday, 6pm.

Nottingham Microcomputer Club: ZX-80/81 users' group, G E Basford, 9 Holme Close, The Pastures, Woodborough, Nottingham.

Orpington Computer Club: Roger Pyatt, 23 Arundel Drive, Orpington, Kent, (Orpington 20281).

Post Office Users' Club: Vernon Quaintain, Head Post Office, St Martin's le Grand, London, EC1.

Scunthorpe ZX Club: C P Hazelton, 26 Rilestone Place, Bottesford, Scunthorpe; (0724 63466).

Worle Computer Club: S W Rabone, 18 Castle Road, Worle, Weston-super-Mare BS22 9JW (Weston-super-Mare 513068). Meetings: Woodsprings Inn, Worle, on alternate Mondays.

ZX Aid: Conrad Roe, 25 Cherry Tree Avenue, Walsall WS5 4LH (Walsall 25467) to cover Walsall and West Bromwich area.

ZX-80/ZX81 Users' Club: PO Box 159, Kingston-on-Thames. A postal club.

Overseas

Belgium, France Luxembourg: Club ZX-80/81, Roger Betz, Chemin du Moulin 38, B-1328 Ohain, Belgium; (322 6537 468).

Denmark: Danmarks National ZX-80/81 Klub (DNZK), Jens Larson, Skovmosevej 6.4200 Slagelese, post giro 1 46 24 66.

East Netherlands: Jonathon Meyer, Van Spaen Straat 22,6524 H.N. Nijmegen; (080 223411).

Germany: ZX-80 Club, a postal club; contact Thomas Jenczyk. Hameln, Postfach 65 D-3250 Hameln, Germany.

Indonesia: Jakarta ZX-80/81 Users' Club, 73 Cnoc Crionain, Baile Atha, Cliath 1.

Spain: Club Nacional de Usuarios del ZX-81, Joseph-Oriol Tomas, Avda. de Madrid, No 203 207, 10, 3a esc. A Barcelona-14 Espana.

United States: Bay Area ZX-80 User Group, 2660 Las Aromas, Oakland CA94611. — Harvard Group, Bolton Road, Harvard MA 01451; (617 456 3967).

MICHAEL ORWIN'S ZX81 CASSETTES

QUOTES

"Michael Orwin's £5 Cassette Two is very good value. It contains 10 stolid well designed games which work, offer plenty of variety and choice, and are fun."
From the ZX Software review in
Your Computer, May '82 issue.

"I had your Invaders/React cassette . . . I was delighted with this first cassette."
P. Rubython, London NW10

"I have been intending to write to you for some days to say how much I enjoy the games on 'Cassette One' which you supplied me with earlier this month."
E.H., London SW4

". . . I previously bought your Cassette One and consider it to be good value for money!"

Richard Ross-Langley
Managing Director
Mine of Information Ltd.

CASSETTE 1
(eleven 1k programs)

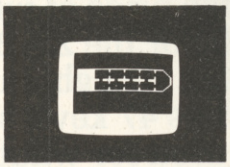
machine code:
React, Invaders, Phantom aliens, Maze of death, Planet lander, Bouncing letters, Bug splat.
Basic:
I Ching, Mastermind, Robots, Basic Hangman. PLUS Large screen versions of Invaders and Maze of Death, Ready for when you get 16k.
Cassette One costs £3.80

CASSETTE 2
Ten games in Basic for 16k ZX81

Cassette Two contains Reversi, Awari, Laser Bases, Word Mastermind, Rectangles, Crash, Roulette, Pontoon, Penny Shoot and Gun Command.
Cassette Two costs £5.

CASSETTE 3
8 programs for 16k ZX81

STARSHIP TROJAN

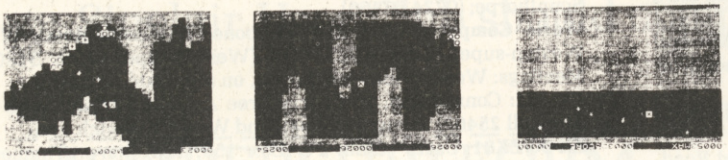


Repair your Starship before disaster strikes. Hazards include asphyxiation, radiation, escaped biological specimens and plunging into a Supernova.

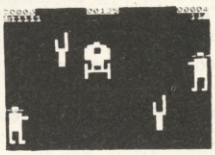
STARTREK This version of the well known space adventure game features variable Klingon mobillity, and graphic photon torpedo tracking.
PRINCESS OF KRAAL An adventure game.
BATTLE Strategy game for 1 to 4 players.
KALABRIASZ World's silliest card game, full of pointless complicated rules.
CUBE Rubik Cube simulator, with lots of functions including 'Backstep'.
SECRET MESSAGES This message coding program is very txlp qexi jf.
MARTIAN CRICKET A simple but addictive game (totally unlike Earth cricket) in machine code. The speed is variable, and its top speed is very fast.
Cassette 3 costs £5.

CASSETTE 4 7 games for 16k ZX81

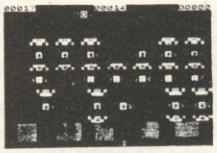
ZX-SCRAMBLE (machine code) with 3 stages.
Bomb and shoot your way through the fortified caves.



GUNFIGHT
(machine code)



INVADERS
(machine code)



GALAXY INVADERS (machine code)
Fleets of swooping and diving alien craft to fight off.
SNAKEBITE (machine code)
Eat the snake before it eats you. Variable speed. (very fast at top speed).

LIFE (machine code)
A ZX81 version of the well known game.

3D TIC-TAC-TOE (Basic)
Played on a 4 × 4 × 4 board, this is a game for the brain. it is very hard to beat the computer at it.

6 of the 7 games are in machine code, because this is much faster than Basic. (Some of these games were previously available from J. Steadman). Cassette 4 cost £5.

Recorded on quality cassettes, sent by first class post, from:
Michael Orwin, 26 Brownlow Rd., Willesden, London NW10 9QL (mail order only please)

ZX99 AUTOMATIC TAPE CONTROL

The logical extension for the Sinclair ZX81 giving data retrieval & word processing

£59-95 plus P&P

The ZX99 Tape Control system is a sophisticated extension to the Sinclair ZX81 Microcomputer, providing remarkable additional capabilities, which allow both the beginner and expert access to a professional computing system without the expected expense.

✸ DATA PROCESSING

The ZX99 gives you full software control of up to four tape decks (two for reading and two for writing) allowing merging of data files to update and modify them. This is achieved by using the remote sockets of the tape decks to control their motors as commanded by a program.

✸ PRINTER INTERFACE

The ZX99 has a RS232C interface allowing you direct connection with any such serial printer using the industry standard ASCII character code (you can now print on plain paper in upper and lower case and up to 132 characters per line.)

✸ MANY SPECIAL FEATURES

There are so many different features that it is difficult to list them all:
For example:

AUTOMATIC TAPE TO TAPE COPY: You can copy any data file regardless of your memory capacity (a C90 has approx 200K bytes on it) as it is loaded through the Sinclair block by block.

TAPE BLOCK SKIP without destroying the contents of memory.

DIAGNOSTIC INFORMATION to assist in achieving the best recording settings.

✸ TAPE DRIVES

We supply (and guarantee its compatability) a Tape Drive that works with your computer.

✸ COMPUTER CASSETTES

We supply quality (screw assembled) computer cassettes.
Please enquire for any not shown:

The ZX99 contains its own 2K ROM which acts as an extension to the firmware already resident in your ZX81'S own ROM. The ZX99's ROM contains the tape operating system, whose functions are accessed via Basic USR function calls. Each function has an entry address which must be quoted after the USR keyword. All of the functions can be used in program statements, or in immediate commands (i.e. both statements with line numbers and commands without them).

There is an extension board on the rear to plug in your RAM pack (larger than 16K if required). The unit is supplied with one special cassette lead, more are available at £1 each (see below).

COMPREHENSIVE USER MANUAL INCLUDED IN PRICE

✸ ZX99 SOFTWARE ✸

We now have available "Editor-99", a quality word processing program including mail-merge, supplied on cassette for £9.95.
Also, following soon will be:

* Stock Control
* Sales Ledger
* Business Accounts
* Order Processing
* Debtors Ledger
* Tax Accounting

COMPUTER CASSETTES	QTY	PRICE	TOTAL
C5		35p	
C10		37p	
C12		38p	
C15		39p	
C20		41p	
C25		43p	
C30		44p	
Add min £1·50 or 10% P & P			

ITEM	QTY	PRICE	P&P	TOTAL
CASSETTES	See left			
ZX99		59·95	2·95	
E312 Tape Drive		24·00	1·00	
EDITOR-99		9·95	·50	
CASSETTE LEAD		1·00	·20	

Cheque/PO payable to Storkrose Ltd.
or
Charge my Access/Visa card no:

SIGNED _____

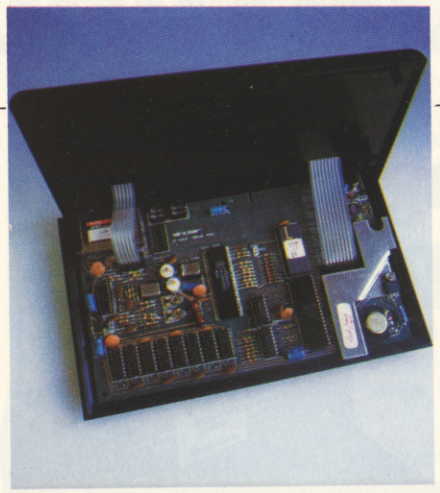
ORDER FORM TO:

data-assette®

Dept: SU3
44 Shroton Street,
London NW1 6UG Tel: 01-258 0409
Telephone enquiries welcome

NAME _____

ADDRESS _____



Stephen Adams looks inside Sinclair's latest machine and finds it has a lot in common with the ZX-81

Taking the lid off the Spectrum

THE ZX SPECTRUM is very similar in shape and style to the ZX-81 and there are many similarities. Sinclair has kept the original keyboard to save space but has provided a rubber sheet with moulded keys on it which fits over the top. The sheet is suspended over the flat keys — which on the ZX Spectrum are bigger than the ZX-81 — so that when a key is pressed it bends to give some feel to the keyboard.

That and the fact that the keys repeat if held down for longer than one second, even when using SHIFT, makes the keyboard much easier to use. The single keyword system has been retained and that saves memory, as all the Basic words can be stored as one byte. It also means that two SHIFT keys are required to reach all the functions; one is called CAPS SHIFT and the other SYMBOL SHIFT. They are at opposite ends of the keyboard and as they are often used one after another, it tends to slow the input speed as you are constantly swapping hands.

For instance, RUBOUT and the cursor movements use CAPS SHIFT and +-* are SYMBOL SHIFT. It would have been a better idea to put both on the left-hand side, as they often need to be used together and could be pressed with one hand while the other searches for the appropriate key.

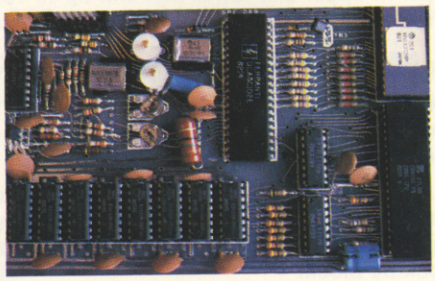
The keyboard is an input-output mapped device, as on the ZX-81, and along with the the ZX printer, which is the same for the ZX-81 and the Spectrum network/RS232 interface, discs, loudspeaker, tape interface and border colours require only one address line to work. That means that you must make all of the lower five address lines a binary 1 to use your own devices.

The input-output map access has been improved greatly, however, with the addition to the Basic commands of IN and OUT. They give an instruction IN A(c) or OUT A(c) where registers BC give an address from 0 to 65535.

The memory-mapped addressing of the RAM/ROM occupies 0-16K and the RAM 16K-32K on the basic 16K model. There is provision for an extra 32K board to be plugged in to IC sockets at the back of the printed circuit board. The 48K version will have the board fitted but to add it later it will cost £60, which I think is expensive.

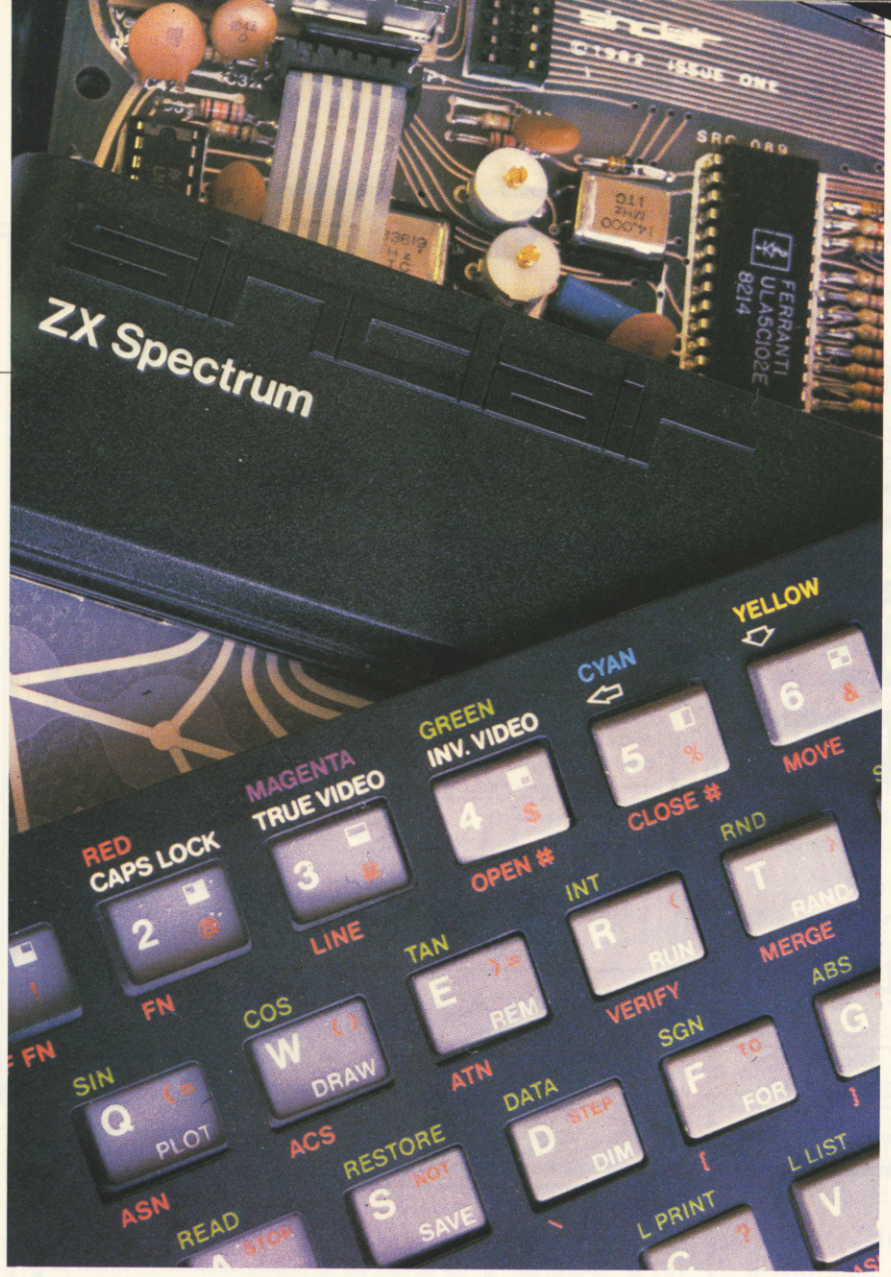
'The Spectrum is real value for money and easy to use. It has some peculiarities but they do not seem important when you look at what it can offer'.

There would be no difficulty in adding extra ports to the memory map, as on the ZX-81, above 32K — on the basic version — but for two things. There is no RAM CS line, so that the extra RAM can be turned-off if required on the edge connector and the edge connector address lines have been moved to the outer edges so that it is incompatible with the ZX-81. The Spectrum has a 28-way double-sided edge connector of the same style as the ZX-81, with the keyway on pin 5. That makes any input-output device compatible with the ZX-81 but any memory-mapped devices would have to be rearranged. The edge connector also has a number of new signals on it which are not explained in the manual, plus a video output and colour outputs for VDUs.



All the voltages used on the Spectrum are also brought out, namely + 5V, -5V, + 12V and -12V. They are obtained from the same buzzing transformer as is used in the 16K RAM pack and most of that RAM pack seems to have been transplanted on to the Spectrum.

The obvious additions to the circuitry are the PAL colour mixer under the metal can which contains the video modulator and the fact that two crystal-controlled oscillators are used, one for the ULA, which controls the screen among other things, and the other for the colour mixer. The 14mHz clock for the ULA is also used to drive the Z-80A microprocessor after it has been reduced to 3.5mHz. That is 0.25mHz faster than the ZX-81. The Z-80A has also been



freed of the job of putting-out the screen — by the ULA — and so no longer requires the commands FAST or SLOW, as it works at top speed all the time except when BEEP or PAUSE is used.

PAUSE and BEEP both cause the Z-80A to stop for a time determined by the programmer and so it will do nothing else while those commands are being done. BEEP commands should be kept short in a program for that reason; 0.01 seconds is a good speed to PRINT AT and BEEP at the same time.

As for programming the Spectrum, it can be considered as an extension of the ZX-81 Basic. The PAPER, INK, BRIGHT and FLASH commands for each character square are stored in a memory map above the dots for each character. They are all stored in one byte per character and can be read by the Basic word ATTR and altered either by Basic commands or POKEs.

The dot screen is a different matter, however, and cannot be altered so easily, as the dots are stored in peculiar order, so you have to use the graphics commands — which can define all the dots on the 22 line by 32 character screen available to the user — or the SCREEN command.

There can be only two colours for each character square, one for the foreground (INK) and one for the background (PAPER), but they can be any one of eight colours. They can also be inverted at a rate of one per second continuously, square by square (FLASH) or have two intensities of colour (BRIGHT).

The screen takes up 6,912 bytes of the 16K memory and the system variables take up another 738 bytes. The rest of the memory is not free for the user to use as 11 other areas float above location 23733 and can expand and contract as required by the Spectrum.

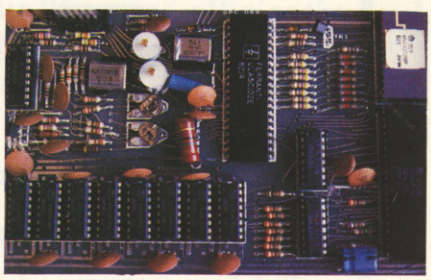
The program and variables are sandwiched in the middle of those, so REM statements cannot be used for machine code. There is an area, however, which can be used for machine code programming above RAMTOP which is ignored by the Basic and its length can be defined by the user.

The user-definable characters area is stored above that so they can be kept from program to program.

There are many tape arrangements which can be made with the Spectrum. The program, strings or machine code can all be SAVEd, LOADed and VERIFYd separately. The variables and screen can also be stored on tape but cannot be VERIFYd. As each is SAVEd, a messsage to start the tape recorder will appear and wait for you to press a key. That is a very good example of the user-friendliness of the machine and most of the errors appear with similar messages.

SAVEing or LOADing causes the border to flash red and green or red and blue, depending at which part of the tape you are looking. All of my tape programs LOADed correctly and I was surprised with the difference in speed between it and the ZX-81.

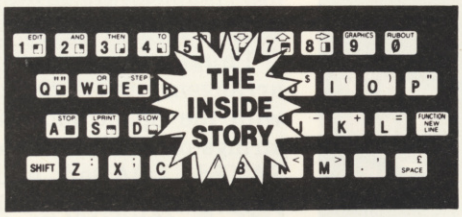
I have been able to deal with only a few subjects. There is so much more to learn about the Spectrum from the manual that it would become a series if I did not stop now.



The Spectrum is real value for money and easy to use. It has some peculiarities but they do not seem important when you look at what it can offer. With disc, networking facilities and RS232 interface it is a great improvement on the ZX-81 but it cannot replace it, as the price of £129.95 will still be a little daunting to those who want to try a computer for the first time.

"THE BEST ZX81 BOOK"

THE ZX81 COMPANION



Bob Maunder

LINSAC

If you have a Sinclair ZX81 and want to use it to its full potential then, as the experts have all agreed, this is the book for you. It contains detailed guidelines and documented programs in the areas of gaming, information retrieval and education, as well as a unique listing of the 8K ROM for machine code applications.

'Far and away the best... once again Linsac has produced the book for the serious end of the market'. – *Your Computer, November 1981.*

'The ZX81 Companion is a most professional product... with many good illustrative programs, tips and warnings'. – *Education Equipment, October 1981.*

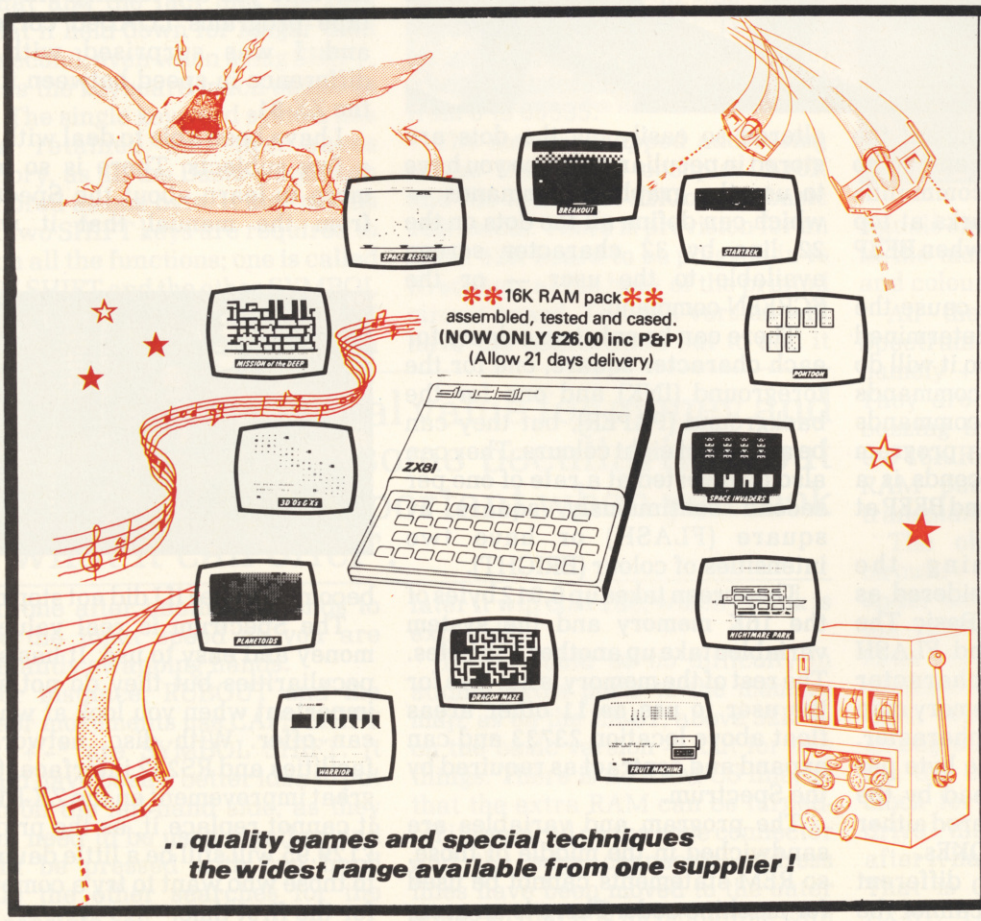
'Bob Maunder's attempt to show meaningful uses of the machine is brilliantly successful... thoughtfully written, detailed and illustrated with meaningful programs... To conclude – the book is definitely an outstandingly useful second step for the ZX81 user'. – *Educational ZX80/81 Users' Group Newsletter, September 1981.*

Send your cheque for **£7.95** (includes UK p&p) to:

LINSAC (SU) 68 Barker Road, Linthorpe, Middlesbrough TS5 5ES.

ISBN 0 907211 01 1

Price **£7.95**



Music		1K	£2.95
Music		2–16K	£3.95
Nightmare Park		14K	£4.95
High Res. Graphics		16K	£3.95
Space Invaders		1K	£4.95
Space Invaders	(I3)	3K	£5.95
Breakout	(B1)	1K	£3.95
Dragon Maze		16K	£4.95
Planetoids		16K	£3.95
Scroll/ Rolling Riter		1–16K	£2.95
Life		16K	£3.95
Startrek		16K	£4.95
Mission of the Deep		16K	£5.95
Fruit Machine and Pontoon		16K	£2.95
Space Rescue		16K	£3.95
Warrior		16K	£4.95
3D "0" & "X"s + Connect Four		16K	£5.95
Assembly B1	listing	1K	£5.95
Assembly I3	listing	3K	£8.95
Hex. Ldr/D.	listing	1K	£1.00

No hardware modifications whatsoever.

S.A.E. for catalogue
All programs supplied on cassette with instructions
Send remittance with order (Cheque, P.O. Card No.) to:-

MACRONICS

Dept. S.U.
26 Spiers Close
Knowle
Solihull
West Midlands B93 9ES

ZX81 GAMES

from

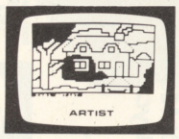
J.K. GREYE SOFTWARE

THE NEW GENERATION SOFTWARE HOUSE

"Without question the finest machine code games available today!"..... J.N. ROWLAND Product Manager for W.H. SMITH.

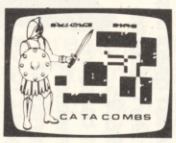
GAMESTAPE 1 for 1K _____ **only £3.95**
10 Games incl. ASTEROIDS, UFO, CODE, BOMBER, GUILLOTINE, KALEIDESCOPE, etc.
PROBABLY THE BEST VALUE 1k TAPE AVAILABLE.

We've done in 1k games which some of our competitors required 16k to do!



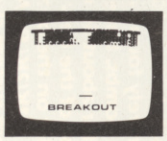
GAMESTAPE 2 for 16K _____ **only £3.95**
***STARFIGHTER** Superb machine code Space Battle. Set against a background of twinkling stars, with stunning explosions – if you can hit the enemy!
PYRAMID Can you move the Pyramid? Make a mistake and it will collapse! A Thinkers game.
ARTIST The ultimate Graphic Designers aid. 8 Directions, 10 Memories, SAVE, COPY, RUBOUT, CLS, etc.

GAMESTAPE 3 for 16K _____ **only £4.95**
***CATACOMBS** A Multi-Level Graphics Adventure. Each level can contain up to 9 Rooms, 8 Passages, 7 Monsters, Food, Gold, Traps, Phantoms, an Exit (to the next level), and there's an infinite number of levels.
NOTE. . . . This is NOT one of the necessarily limited text Adventures as sold elsewhere.
"An excellent addictive game which will keep you amused for hours.". . . . *COMPUTER & VIDEO GAMES.*



GAMESTAPE 4 for 16K _____ **only £4.95**
***3D MONSTER MAZE** The Game to Top All Others. Unbelievable Graphics! Can you find your way through the Maze? The EXIT is there somewhere, but then so is a T.REX, and its after YOU! All in 3D (the T.REX will actually run towards you in full perspective!), you've never seen anything like this before!
"3D MONSTER MAZE is the best game I have seen for the ZX81". . . COMPUTER & VIDEO GAMES
"If I had to choose just one programme to impress an audience with the capabilities of the ZX81, then J.K. Greye's 3D MONSTER MAZE would be the one without doubt" . . . . ZX COMPUTING.

GAMESTAPE 5 for 16K _____ **only £4.95**
***3D DEFENDER** The Ultimate Space Game. Super fast Machine Code 3D version of the Arcade favourite. You have to save your home planet from the marauding Alien Spacecraft. This is all in 3D, your viewscreen shows you the view out of your fighters cockpit window. The backdrop moves when you turn, or fly up or down (8 flight directions), just as if you were really flying it! But then YOU ARE! The Enemy Saucers will actually zoom towards you in 3D, and shoot you if you let them! Your display includes Score, Shield Strength, Altitude, Proximity, Forward Radar and your viewscreen, which shows your rotating home planet, backdrop of Stars, Meteors, Explosions, Plasma Blasts, your Photon Beams, up to 4 Enemy Saucers and of course its all in full 3D!
A SMASH HIT at the ZX Microfair (most of the other software houses wanted a copy), a game not to be missed!



GAMESTAPE 6 for 1K _____ **only £1.95**
***BREAKOUT** Super Fast Full Screen Display Game. Your all time favourite with an added twist. See how much Money you can win and watch the pounds convert to Dollars. All in Machine Code for Fast Action with 3 Speeds, 2 Bat Sizes and three angles of rebound! The best BREAKOUT around and at this price you can't go wrong!

GAMES MARKED * INCL. MACHINE CODE.
Prices include VAT and U.K. P. & P.
(Add appropriate Postage on Foreign Orders). Cheques/P.O.s to

J.K. GREYE SOFTWARE
Dept. SU, 16 Park St., Bath, Avon BA1 2TE.
CREDIT CARD SALES: Phone: 01 - 839 - 4465 (9 a.m. - 7 p.m.)
FOR INSTANT DESPATCH

If you prefer to see before buying, our range of **GAMESTAPES** are stocked by the following stores.

BUFFER MICROSHOP 374A, Streatham High Rd., London SW16
GEORGES 89 Park St., Bristol, Avon.
MICROSTYLE 29 Belvedere, Lansdown Rd., Bath, Avon.
MICROWARE 131 Melton Road, Leicester.
SCREEN SCENE 144 St. Georges Rd., Cheltenham, Glos.
W.H. SMITH Computer Branches.
ZEDXTRA 5 School Lane, Kinson, Bournemouth, Dorset.

TRADE & EXPORT ENQUIRIES WELCOME

ZX Spectrum
20 Programs £6.95

The ZX Spectrum has brought advanced computing power into your home, The Cambridge Colour Collection, a book of 20 programs, is all you need to make it come alive.

No experience required. Simply enter the programs from the book or load them from tape (£2.95 extra) and run.

Amazing effects. All programs are fully animated using hi-res graphics, colour and sound wherever possible.

Entirely original. None of these programs has ever been published before.

Proven Quality. The author already has 30,000 satisfied purchasers of his book of ZX81 programs.

Hours of entertainment

- **Lunar Landing.** Control the angle of descent and jet thrust to steer the lunar module to a safe landing on the moon's surface.
- **Maze.** Find your way out from the centre of a random maze.
- **Android Nim.** Play the Spectrum at the ancient game of Nim using creatures from outer-space.
- **Biorhythms.** Plot the cycles of your Emotional, Intellectual and Physical activity. Some would say this is not a game at all.

Improve your mind

- **Morse.** A complete morse-code training kit. This program will take a complete beginner to R.A.E. proficiency.
- **Maths.** Adjustable to various levels, this program is an invaluable aid to anyone trying to improve their arithmetic.

Run your life more efficiently

- **Home Accounts.** Keeping track of your finances with this easy-to-use program will enable you to see at a glance where the money goes and plan your spending more effectively.
- **Telephone Address Pad.** Instant access to many pages of information.
- **Calendar.** Displays a 3 month calendar past or future, ideal for planning or tracing past events.

ORDER FORM:

Send Cheque or P.O. with order to:–
Dept. D., Richard Francis Altwasser, 22 Foxhollow, Bar Hill, Cambridge CB3 8EP

Please send me

☐ Copies Cambridge Colour Collection Book only £6.95 each.
☐ Copies Cambridge Colour Collection Book & Cassette £9.90 each

Name: _____

Address: _____

_____

dk'tronics ZX 80/81 Hardware Software

4K Graphics rom

SOME OF THE GRAPHICS NOW POSSIBLE ON THE ZX81

The dk Graphic module is our latest ZX81 accessory. This module, unlike most other accessories fits neatly inside your computer under the keyboard. The module comes ready built, fully tested and complete with a 4K graphic ROM. This will give you an unbelievable 448 extra pre-programmed graphics, your normal graphic set contains only 64. This means that you now have 512 graphics and with their inverse 1024. This now turns the 81 into a very powerful computer, with a graphic set rarely found on larger more expensive machines. In the ROM are lower case letters, bombs, bullets, rockets, tanks, a complete set of invaders graphics and that only accounts for about 50 of them, there are still about 400 left (that may give you an idea as to the scope of the new ROM). However, the module does not finish there; it also has a spare holder on the board which will accept a further 4K of ROM/RAM. This holder can be fitted with a 1K/2K/ RAM and can be used for user definable graphics so you can create your own custom character sets. £29.95.

ZX Keyboard

Now with repeat key and facilities to add numeric pad. The keyboard has all the 80/81 functions on the keys. The keyboard has been specially designed for the Sinclair computer and is supplied ready-built and tested. It also has facilities for 3 extra buttons which could be used for on/off switch, reset, etc. £27.95. Numeric add on £10

Now from dk'tronics

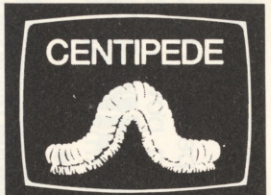
a. 4K Tool Kit full of utilities to aid the programmer in constructing and debugging. E.PROM version for use with graphics ROM £9.96 cassette version £6.95.

b. 16K Ram massive add on memory fully assembled and tested £19.95.

c. Flexible Ribbon Connector (as illustrated).

16K 81 Software

AS SEEN AT THE ZX MICROFAIR



CENTIPEDE
This is the first implementation of the popular arcade game on any micro anywhere. Never mind your invaders, etc., this is positively stunning, the speed at which this runs makes ZX invaders look like a game of simple snap. £4.95.

3D/3D LABYRINTH
You have seen 3D Labyrinth games, but this goes one stage beyond; you must manoeuvre within a cubic maze and contend with corridors which may go left/right/ up/down. Full size 3D graphical representation. £3.95.

GRAPHIC ROM SOFTWARE

★ **Asteroids**
★ **Space Invaders**
★ **Centipede**

dk'tronics

Buy now why wait and pay more
Immediate delivery

Send off the coupon today or telephone Great Yarmouth (0493) 602453 during office hours quoting Barclaycard or Access number.
(Please add on £1 for P/P).

23 Sussex Road,
Gorleston,
GREAT YARMOUTH,
Norfolk.

Please state type of machine and which ROM memory size when ordering.

Please send me ..... 4K Graphics ROM/S @ £29.95.
Please send me ..... ZX Keyboard/s @ £27.95. (Numeric add on £10)
Please send me ..... Centipede/s @ £4.95.
Please send me ..... Labyrinth @ £3.95.
Please send me ..... Graphics ROM software Centipede @ £4.95.
Please send me ..... Space Invaders and Asteroids @ £4.95 each
Please send me ..... 4K Tool Kit @ £9.96. (Cassette version £6.95).
Please send me ..... 16K RAM add on memory @ £19.95.
Please send me ..... Flexible Ribbon Connector/s @ £10.

I enclose £.....

Name .....

Address .....

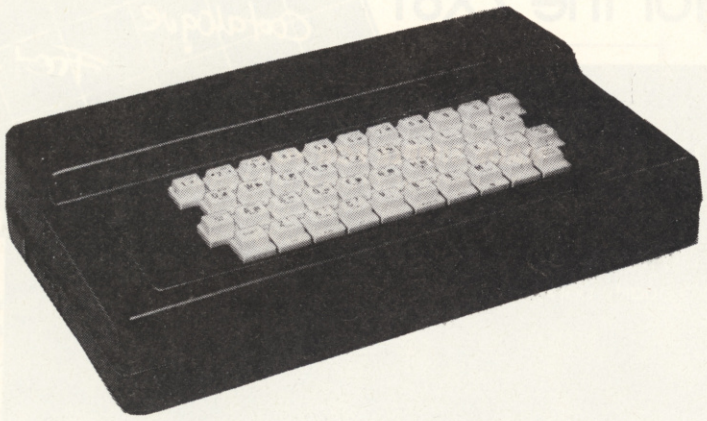
.....

Please add on £1 for P/P.

Cheques/P.O. payable to DK Tronics.

FULLER FD SYSTEM £39.95

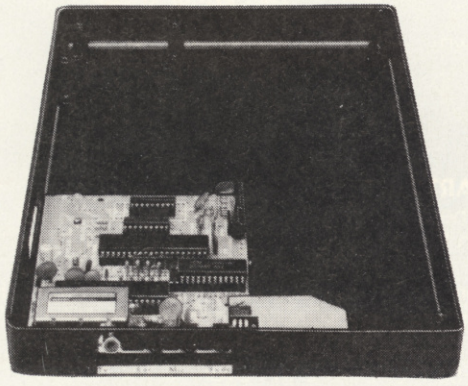
Professional Keyboard & Case for Sinclair ZX81 & ZX Spectrum

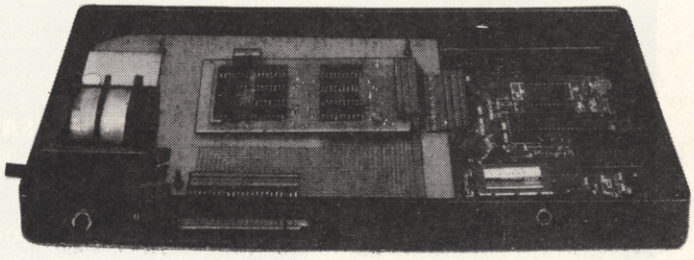


The ZX81 fits inside
The tough ABS injection moulded plastic case measures 8" x 14" x 2½" and hooks up to your ZX printed circuit board in minutes. No technical know how or soldering is required.

The ZX16K Memory Module will fix inside the case, using the new Adaptor Board at £9.75 or the Motherboard.
By removing the ZX PSU from its case this can also be fixed inside. We will carry out the installation work free of charge if required.

KEYBOARD LAYOUT:
All the Sinclair ZX81 keys are duplicated on our layout, with extra shift and new line keys. The professional momentary action key switches have a guaranteed life of 10^6 operations. The unit is fully built tested and comes complete with a money back guarantee.





INSTALLATION
Simply unscrew the ZX printed circuit board from its case and screw it into the FD Case.

MOTHERBOARD:
We also manufacture a mother board which allows expansion to the ZX memory and 1/0 facilities WITHIN the case, as well as our power supply unit and reset switch.

AD Code zxu		Price †	Qty	Amount
Fuller	FD System 42 Keyboard & case	39.95		
	FD System Motherboard	15.95		
	FD 16K. Memory Module	29.95		
	FD 64K. Memory Module	78.95		
	FD PSU 9 Volts at 2 amp.	12.95		
	FD *Shipping and Handling*	2.50		

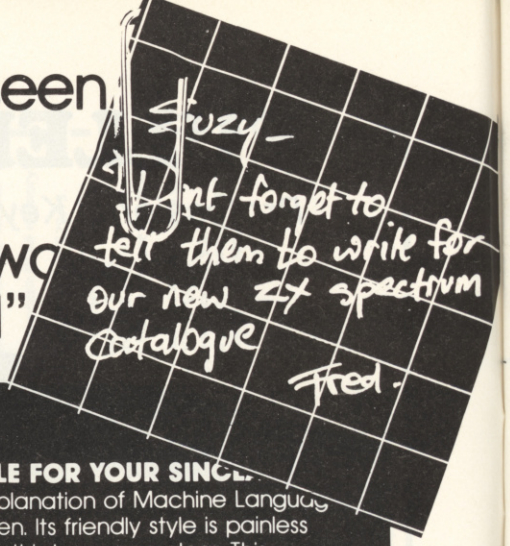
Keyboard Only Available!
Built £24.95
Kit £18.95 (+P.P. 80p)

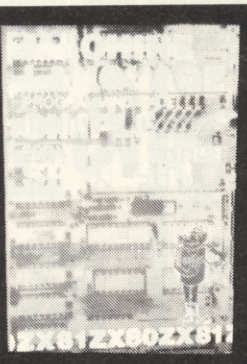
Mail to **FULLER MICRO SYSTEMS,**
The ZX Centre, Sweeting Street, Liverpool 2. England, U.K.
SAE for more details — Enquiries: Tel. 051-236 6109

Name .....
Address .....
City/State/Zip .....

"Best explanation I've seen . . . this is a must" *

"Best independent softwa package for the ZX81"





MACHINE LANGUAGE MADE SIMPLE FOR YOUR SINC

Syntax * Magazine said: "It's the best explanation of Machine Langua for Machine Language beginners I've seen. Its friendly style is painless reading and simple analogies help make this language clear. This introduction is a must."

Available as a quality paperback, 160 pages, £9.75 including post, pack and V.A.T.

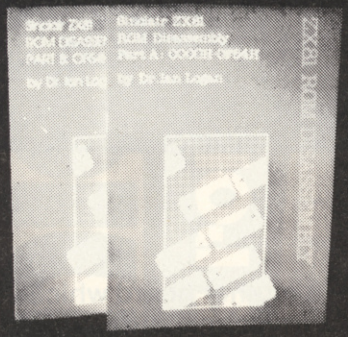
UNDERSTANDING YOUR ZX81 ROM by Ian Logan

Dr. Ian Logan was the 1981 winner of the Rosetta Stone Award★, given to the best independent product, software package or application for the Sinclair ZX80 or ZX81, for his perceptive insights into the way the ZX81 ROM operates.

This book explains ZX80 Machine Language in terms of the ZX81 ROM, giving numerous examples of routines from the ROM, and explains the structure and organisation of the ROM, including routines from the ROM you can use yourself.

A special section explains how to use machine code routines in your own BASIC programs.

Available as a quality paperback, 164 pages, £9.75 including post, pack and V.A.T.



ZX81 ROM DISASSEMBLY PARTS A & B

Dr. Logan is also the author of these two titles (see above) which are an invaluable source of information for the serious ZX81 Machine Language programmer.

Part A lists all locations and subroutines in the ROM from OOOOH to OF54H and covers all the operating functions of the ROM except the floating point calculator.

Part B lists all locations from OF55H to 1DFFH and covers all the routines involved in the 'evaluation of an expression' and a detailed explanation of the 'floating point calculator'. Co-authored by Dr. Frank O'Hara.

Part A, 30 pages, £7.80 including post, pack and V.A.T.

Part B, 84 pages, £8.80 including post, pack and V.A.T.

Other titles available:

Not only 30 programs for the Sinclair ZX81: 1K

Not only over 30 programs, from arcade games to the final challenging Draughts playing program, which all fit into the unexpanded 1K Sinclair ZX81 but also notes on how these programs were written and special tips! Great value!

120 pages, £7.75

Complete Sinclair ZX81 Basic Course

The Complete Basic Course is a 240 page in-depth comprehensive text for complete beginners and experienced programmers. Over 100 programs and examples illustrate the use and possibilities of the Sinclair ZX81. This is an invaluable reference guide for all ZX81 owners.

256 pages, £18.30

Special Discount for ordering more than 1 title

If you order more than one title at a time, you get a discount of 80p per additional title: If you order 2 books, deduct 80p from the total; order 3 books and deduct £1.60; order 4 books and deduct £2.40!!

Orders to Melbourne House Publishers, 131 Trafalgar Road, Greenwich London SE10
Correspondence to Glebe Cottage, Station Road, Cheddington, Leighton Buzzard, BEDS LU7 7NA

Name.....

Address.....

.....Postcode.....

The Complete Sinclair ZX81 BASIC Course	£18.30	☐
Basic Course Programs on Cassette	£3.30	☐
Not Only 30 Programs/Sinclair ZX81:1K	£7.75	☐
Machine Language Programming Made Simple	£9.75	☐
ZX81 ROM Disassembly Part A	£7.80	☐
ZX81 ROM Disassembly Part B	£8.80	☐
Understanding Your ZX81 ROM	£9.75	☐

Remittance enclosed £.....

Less Special Quantity Discount £.....

SU

Smith adds to micro range

W H SMITH expects to be selling another computer by the end of the year. It is talking to a number of manufacturers about stocking their micros to add to the ZX-81 which it began selling last September.

John Rowland, market development manager, is giving nothing away about which machine it might be but expects a decision to be made in August.

It is the next major step in the company's move into the home computer market, which it sees as a major growth area. It is already extending the number of branches selling computer goods and increasing the amount of selling space, particularly in the larger branches.

"We sell 50 lines of software and are increasing that all the time. We think we are ready to take the next step in offering a new machine," Rowland says.

He added that when the new product is launched it is hoped it will be accompanied by a full range of software. He expects that by next year the company will be selling more than 100 lines of software.

John Rowland, market development manager of W H Smith

Rowland says that in the next few years W H Smith would probably like to sell about three machines with a full range of hardware add-ons and software. After that, he thinks the market will probably go the same way as the record market, with some retailers concentrating on hardware and others on software.

Of the hardware market, he says that Smith's entry will depend on manufacturers agreeing to a standard interface. Without that it would not be possible to generate sufficient sales to make it worthwhile. The retailer is looking for high-volume sales, which is why it chose to enter the market with the ZX-81.

Rowland added that Smiths is also looking at the possibility of becoming a software publisher. The company already receives many suggestions each week.

Clive to run in half-marathon

CLIVE SINCLAIR's energy seems to be endless. Not only is he able to mastermind one of the most successful computer companies in the world — he has enough strength left to run marathons.

He has already run one distance of more than 26 miles and now he is to take part in a half-marathon being organised as part of the 1982 Cambridge Festival.

Sinclair Research is sponsoring the event with £5,000 and it is expected that 2,000 competitors will be taking part, including a number of top-class runners.

The race will be held on Sunday, July 18 and will follow a course through the city's historic streets,

The company, which is based in Cambridge, sees the sponsorship of the race as part of supporting the cultural life in the city. It will also be sponsoring a concert in King's College, Cambridge as part of the festival.

ZX fairs spread to North

THE FIRST exhibition for ZX users to be held in Birmingham is attracting a great deal of interest, despite its clash of dates with the Personal Computer World show in London. The organiser, Eric Deeson, says that about 40 of the major companies in the market are taking space.

The idea for Microscene Brum 82, on Saturday, September 11, resulted from the successful ZX Microfairs in London.

"Many people said how inconvenient it was having to go to London so we thought we would try for a regional show," Deeson says. He is hoping to attract people from all over the Midlands and further north.

Meanwhile a general microcomputer fair is being held at Manchester on July 24 and 25. It is being held in conjunction with the University of Manchester Institute of Science and Technology at Sackville Street, Manchester and is aimed at the education and small business markets.

Brain power wins ZX-81s

TWENTY-THREE regional winners in this year's Mensa Superbrain competition have been awarded ZX-81s. The awards were prompted by Clive Sinclair's involvement with the British Mensa Society, of which he is chairman.

The competition is an annual event and is set to be a test of intelligence rather than memory, as in Mastermind and Brain of Britain. It is usually run in conjunction with provincial newspapers on a regional basis, with the regional winners proceeding to the final. This year, for the first time, extra sections were organised through the independent local radio network, which provided five regional winners.

Radio Sinclair

There seems to be no limit to the uses which can be found for the ZX-81 Here Julian Moss reports how it has been of help in amateur radio.

AMATEUR RADIO is a hobby as old as radio itself. Ever since Marconi sent the first transmission across the Atlantic, radio amateurs have been experimenting with new modes of communication and, in the process, making friends across the world.

Many of today's radio amateurs use commercially-made equipment but there is still a good deal of experimenting, in aerial design for example, and at very high frequencies. Like any technical hobby, there are many uses for a computer and the ZX-81 has found its way into many radio shacks. Its uses fall primarily into three areas — information storage and retrieval, mathematical and scientific programs, and real-time on-the-air applications.

Programs in the first category are fairly straightforward. One example is an index of radio stations contacted or heard. Every radio amateur has his own call-sign, in which the first two or three characters denote the country — for example, the G4 in the call-sign G4ILO indicates England. Since a typical ham may make thousands of contacts in a year, it is impossible to remember every one.

By storing on the computer each call-sign, along with the operator's name, town, the date and perhaps other details, it is possible to recall immediately whether or not a station has been contacted previously and to see the details of the contact.

The data can be sorted into call-sign order, to see how many countries have been contacted — useful since many amateurs compete for certificates which are awarded for contacts with, for example, 100 countries.

Another use for the computer is to compile an index of technical articles in radio and electronics magazines. Most radio amateurs, like home computer enthusiasts, accumulate magazines devoted to their hobby. It is frustrating to search issue after issue looking for an article you remembered reading a few months ago. If a description of each article is stored in the computer, together with the name of the publication, its issue date and the page number, it is possible to have a program which will search the descriptions and produce a list of all the articles relating to a particular topic. Typically, more than 300 references can be stored on a 16K ZX-81.

Another facet of amateur radio is contests. On some weekends, amateur operators from all over the world try to make as many contacts as possible in a given period, usually 24 hours. The scoring varies from contest to contest but usually is based on the number of contacts made and the number of country

prefixes, or even the total distances over which the contacts were made.

Keeping the score is an ideal job for a computer, which can also log each call-sign and display a message if a station has been contacted previously in the contest.

On the technical side, there is a vast number of uses for the ZX-81. Two examples are aerial design, when the computer can be used to work-out the dimensions of an aerial for a particular frequency, and even to calculate its theoretical performance; and the design of electronic circuits.

American magazines publish programs of that nature frequently. Those programs are usually written for the most popular home computers in the U.S., such as the TRS-80, but it is fairly straightforward to convert them to run on the ZX-81, the main differences being that the TRS-80 does not require the word LET in an assignment statement and that it allows multiple statements on one line.

Another popular application is Oscar tracking. Oscar stands for Orbital Satellite Carrying Amateur Radio. It is a satellite designed, built and paid for by radio amateurs, and launched by NASA on their behalf. The satellites pick up amateur transmissions on one frequency and re-transmit them on another, allowing communication over distances which might otherwise not be possible.

To use Oscar, it is necessary to know where it is at any given time and so a program can be used to predict when the satellite is 'visible' from a location and in which direction to point the aerials.

One problem which radio amateurs soon encounter when they put a computer in the shack is interference. The ZX-81 radiates a good deal of radio noise, which is picked up by the receiver and can easily obliterate weak signals. Usually it is necessary to screen the case carefully, using aluminium foil, and to filter the lead from the power supply. The RAM pack must be screened as well.

The reverse of that situation can also occur, when RF from the transmitter interferes with the operation of the computer. This is not usually a problem with the ZX-81, however, although the television used for the display can be affected sometimes.

Once those problems have been overcome, the computer can be used on-the-air to send and receive Morse code and radio-teletype signals, and even to control the station. Many of the new amateur radio transceivers use a microprocessor to control the various functions such as frequency and mode, and the various control lines are brought out to a socket at the back.

Using a suitable interface, it would be possible to program the ZX-81 to scan selected frequencies, perhaps to record whether or not a signal is present, to build a picture of amateur band activity at various times of the day, or to monitor the strength of particular distant stations. It would even be possible to program the computer to scan the band for stations using Morse code and reply to them automatically.

It is possible to generate Morse code without using additional hardware, using the cassette output socket. That output can be fed into an amplifier, or recorded on tape for Morse practice. It is also possible to feed code into the cassette input socket, decode it, and display the text on the screen. The main difficulty is that, in SLOW mode, the ZX-81 spends about 15 out of every 20 milliseconds displaying a picture on the TV and that interferes with the generation or reception of the code. Thus programs for Morse or RTTY usually are written to run in FAST mode.

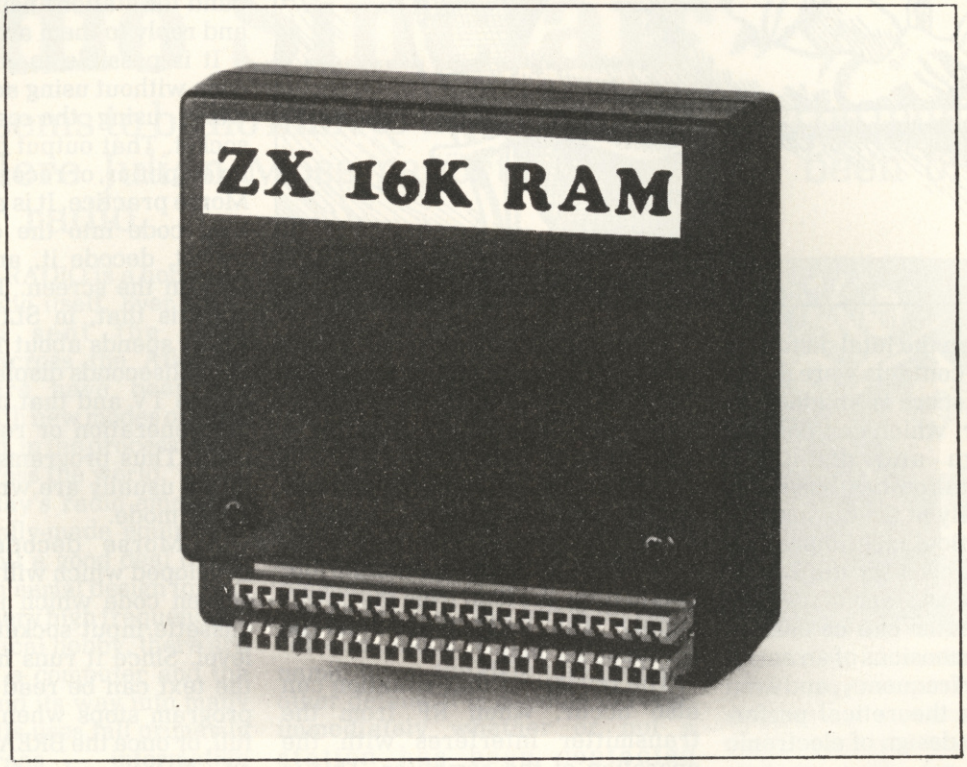
A Morse decoder has been developed which will display on the screen code which is fed into the cassette input socket at a suitable level. Since it runs in FAST mode, the text can be read only once the program stops when the screen is full, or once the BREAK key is pressed. Noise and interference will upset the decoding and the signal should go ideally through a narrow-band filter, so that only the wanted signal is fed into the ZX-81.

The program uses a short USR routine to read the cassette input port. The routine is 24 bytes long and is stored in the first REM statement of the program. The easiest way to enter the routine is to type-in a REM with 24 characters in it and then to POKE into locations 16514 to 16537 the values given in the table following the program listing. The routine returns a value of 0 if no signal is present at the input port, or a positive number if one is present.

There is a Sinclair Amateur Radio Users' Group in the U.K. Anyone interested should contact Paul Newman, G4INP 3 Red House Lane, Leiston, Suffolk, IP16 4JZ, enclosing a stamped addressed envelope for details.

'The computer can be used on-the-air to send and receive Morse code and radio-teletype signals'.

NEED MORE MEMORY FOR YOUR ZX81...?



16K-£19.95

* FREE *

16k Bank Account cassette by Futuresoft +£3 Trade in on our 16k unit for a 64k unit if returned within 6 months.

64K-£47.95

we at Pretorius Systems have commissioned a leading electronics company to design for us a low cost VERY high quality memory module specifically for the ZX81. It can be used in any expansion system and simply plugs into the back of your ZX81 and as such is fully compatible with the ZX81 printer.

The 16k module will give you 16 times more memory and is finished in ABS plastic. Their is also a 64k version which will provide you with a pure 64k of program POWER. This amazing achievement is packed into exactly the same casing as the 16k module and looks identical. Note: these units are BRITISH made and should not be confused with low quality imports that overheat and have sloppy connectors.

Nothing more to pay! Prices include VAT + FREE postage (overseas orders +£2) 14 days money back offer if not satisfied + 6 months warranty.

Your order is recieved at 8.30 and is despatched by 12.30 the same day.

PLEASE SEND ME:

Date _____

Name _____

Address _____

	Quantity	Price	Total
16k		19.95	
64k		47.95	

Payment to: PRETORIUS SYSTEMS

Mail to: B.C.M. BOX 7977. WC1N. LONDON. ENGLAND.

Nicole Segre finds that, despite her reservations, understanding the ZX-81 is only a matter of time.

Discovering the adult charms of the ZX-81

I COMPLAINED at some length last month about the upheavals caused in the household by my son's purchase of one small, seemingly innocuous electronic machine called a ZX-81. What distressed me most was that he and his friends, all mere babes in arms, seemed possessed of a technical skill and expertise with regard to computers which left me feeling decidedly passé.

I have determined to remedy all that. It is important, in my view, not only to keep up with the times but to teach all those uppity youngsters not to under-estimate their mothers. Accordingly, I waited for a short pause between a game of **Star Bash** and a game of **Clonk!** and obtained my son's permission to tinker with his Sinclair during those hours when attending to his education kept him away from more pressing matters. "Is there anything I must not do?" I enquired anxiously. "No, it's all right," he said. "Computers are idiot-proof."

Letting that go, I set to work the next morning and I made an astonishing discovery — it's easy. All you have to do to use a ZX-81 is fellow the instructions and, believe me, if I can follow the instructions, anyone can. To be honest, I am a wonderful human being with many precious gifts but a way with inanimate objects is not one of them.

So far as I am concerned, sexual equality stops short of changing tyres or replacing washers and, as for electricity, I am like the man who thought there was cold electricity for refrigerators and coloured electricity for traffic lights.

Yet in no time at all I was able to use a sophisticated piece of equipment, even to the extent of programming it to tell a silly joke. Now, I am just letting-up before racing on to looping, graphics and organisation of memory, which sounds just the kind of thing I need.

Having said that, however, I can admit freely that it has not all been plain sailing. In fact, at first it seemed as if the whole self-improvement plan would never get off the ground. A 13-year-old's bedroom is probably not the best place to conduct an important research project of this kind and my son's bedroom possesses sufficient electrical wiring to knit a fisherman's sweater.

continued on page 26

continued from page 25

You are ready to begin, the manual said, when a K appears in the bottom left-hand corner of the screen but for that to happen I had to find the socket in which to plug the socket in which to plug the plug.

Several hours later, I emerged, hot and dusty, from under the bed, and there was the magic K. Fingers at the ready, I turned once more to the excellent manual, which I cannot praise enough for its clarity and wealth of incidental detail. I had no difficulty with adding 2 + 2, cursors, the history of computer languages and how to erase mistakes but the chapter on using the computer as a calculator caused a twinge of anxiety.

I don't even use a calculator as a calculator. I know what a square root is, and even pi, although I cannot remember when I last used it; but integers and exponential functions? They must have done those while I was away from school with chicken pox. Anyway, having managed without them for so long, I thought I might continue to do so and skipped to the next section.

That looked more promising, being all about the price of eggs. Those I do use and although I can usually work out their price, give or take a few pence, in my head, it amused me to let the computer do it. It could even, the manual said, tell me the square of the cosine of the price of one egg, should I ever want it. Well, you never know. I was glad, too, that the manual catered for the eventuality of my housekeeper rushing in, full of concern, and crying in that delightfully old-fashioned way of hers: "Glory be, eggs have gone up to 61 pence a dozen."

What worries me, though, is how am I going to tell the kind soul that, thanks to my handy little computer, I shall soon be able to dispense with her services?

Things took a downturn, however, with the price of butter and yeast. Having missed a vital piece of information about semi-colons — buried treacherously as I later discovered in that frightening mass of higher mathematics — I suddenly lost control. A stern S — for Stupid? — kept appearing to say I had it all wrong and when I attempted to put it right, everything went from bad to worse.

The trouble is that I am used to a typewriter keyboard, not one which moves things about and has about 12 instructions per key and erases backward to boot. I knew you could pull out the plug and start again but that seemed a little drastic. It reminded me of my one and only skiing holiday when learned to negotiate a slope, more or less, but not to stop. To do that, I would throw myself into the first convenient snowdrift but I always thought there must be a better way.

Eventually, it all came clear to me and I was chugging along again happily. At one point I even thought that, together, the computer and I would crack that eternal problem of the length of a piece of string but it proved to be more a matter of whether Mr Smith was shorter than Mr Smythe. I don't think I had that correct. By then my earlier struggles had worn me out and, besides, there was a good film about to start on the other channel.

My studies may not be very advanced but I see now how one could become very involved in all this. From the start, I have wondered what possible use a computer such as my son's could be and I still don't know — but who cares? Pressing buttons is fun.

Unnecessary though a ZX-81 may be, what a marvellously clever and obedient little chap it is. Do this and do that, the manual says, and the computer will do this and do that — and it does what else in life is so simple and so satisfying?

Anyway, I could not stop now. All kinds of fascinating things have caught my eye — measles programs, Venusians with eight fingers and no thumbs, flowcharts — and I must investigate. If anyone wants me in the next few days, please speak to the housekeeper.

'Unnecessary though a ZX-81 may be, what a marvellously clever and obedient little chap it is'

READ-OUT

READ-OUT FOR SOFTWARE & BOOKS

READ-OUT PUBLISHING LTD

8 Camp Road, Farnborough, Hampshire, GU24 6EW
Telephone: 0252 510331/2 Telex 858001 GOWER G

THE ZX BOOK CLUB

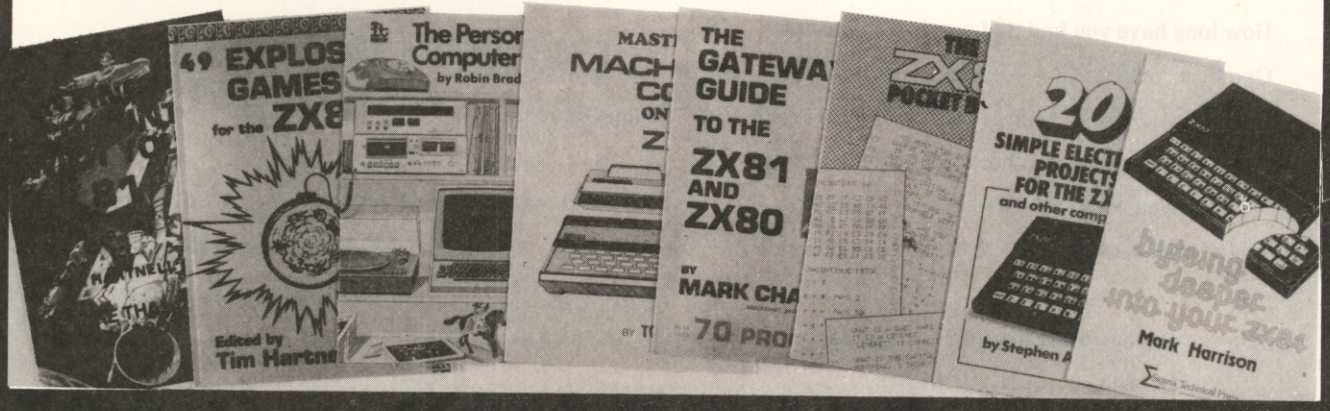
The ZX81 is the world's biggest selling computer and, just announced, is its big brother, the **ZX SPECTRUM.**

For value for money, these two computers must be the best "computer" buys on the market – but – to get the most from them, every owner, and prospective owner, needs a library of books for programs and operations.

Read-Out has selected the following bestselling books and can supply from stock.

For the Beginner:– **Getting Acquainted with your ZX81** by Tim Hartnell, containing over 80 programs. **34 Amazing Games for the ZX81** by Alistair Gourlay, which shows you what you can do with only 1K of memory. **49 Explosive Games for the ZX81** by Tim Hartnell which describes games listings for the memory sizes 1K – 8K. *Coming Soon!* **Learning to Use the ZX81** by Robin Bradbeer and **Learning to Use the ZX Spectrum** by Robin Bradbeer – two new books in a new series designed to help the first-time user (both due August/September 1982). **The Personal Computer Book 2nd edition** by Robin Bradbeer – an introduction to the world of microcomputing which is generally regarded as the best available.

For the Enthusiast:– **Mastering Machine Code on your ZX81** by Toni Baker will help you develop your programming skills to a point where you can really use machine code easily. **The Gateway Guide to the ZX81 and ZX80** by Mark Charlton is a "doing" book describing each function and statement in turn, illustrates it in a demonstration routine or program and then combines it with previously discussed material. **The ZX81 Pocket Book** by Trevor Toms covers the use of the ZX81 in detail and leads the reader into a clear understanding of programming. A brand new book is **20 Simple Electronic Projects for the ZX81** by Stephen Adams which can really put your ZX81 to practical use in a number of interesting electronic projects – thermometer, burglar alarm, voltmeter etc. **Byteing Deeper into your ZX81** by David Johnson-Davies – the bestseller which tells you how to get to grips with your ZX81 and with 39 programs to match!



Order through **READ-OUT PUBLISHING COMPANY LTD**

8 CAMP ROAD, FARNBOROUGH, HAMPSHIRE GU24 6EW.
24 hour answering service. Telephone: 0252 510331/2

Name _____

Address _____

_____

Make cheques payable to Read-Out Publishing Company Ltd.

I enclose my cheque for £.....

Please debit my Access ☐

Number ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Signed _____

Date _____

Please send me : copy/ies of :
All prices include postage.

- ☐ Getting Acquainted with your ZX81 @ £6.95
- ☐ 34 Amazing Games for the 1K ZX81 @ £5.95
- ☐ 49 Explosive Games for the ZX81 @ £6.95
- ☐ Learning to Use the ZX81 @ £5.95 (due Aug/Sep)
- ☐ Learning to Use the ZX Spectrum @ £5.95 (due Aug/Sep)
- ☐ The Personal Computer Book @ £7.55
- ☐ Mastering Machine Code on Your ZX81 @ £8.50
- ☐ Gateway Guide to the ZX81 @ £7.45
- ☐ The ZX81 Pocket Book @ £6.95
- ☐ 20 Simple Electronic Games for the ZX81 @ £7.45
- ☐ Byteing Deeper into your ZX81 @ £6.45

ZX/1

Reader survey

1 Into which range does your age fall?

Under 16 ☐ 16-25 ☐ 26-35 ☐ 36-45 ☐ 46-55 ☐ 56-65 ☐ Over 65 ☐

2 Are you in employment? yes/no

If yes, give type of employment.....

If no, state whether student, retired, or whatever.....

3 Into which ranges does your income fall?

Less than £5,000 ☐ £5,000 to £10,000 ☐ £10,000 to £15,000 ☐ £15,000 to £20,000 ☐

More than £20,000 ☐

4 Do you own a Sinclair computer?

Which one? ZX-80☐ ZX-81☐ Spectrum ☐

How long have you had it? Less than one month ☐

One to six months ☐ Six to 12 months ☐ Longer than 12 months ☐

How did you buy it? Mail order ☐ W H Smith ☐ Second-hand ☐

If you intend buying another model, which one?.....

If not, do you use someone else's? yes/no Do you intend buying one? yes/no

Which one? ZX-80 ☐ ZX-81 ☐ Spectrum ☐

5 Do you use any other system? yes/no

Which one?.....

6 Do you own any peripherals? State makes.

Cassette player ☐ .....

RAM pack ☐ .....

Printer ☐ .....

Keyboard ☐ .....

Motherboard ☐ .....

Any other hardware ☐ .....

How did you buy them? Mail order through *Sinclair User* ☐

Other mail order ☐ Microfairs ☐ W H Smith ☐

Other sources, give details.....

.....

To help us plan for the future and to ensure that we maintain the high standards which *Sinclair User* has achieved in its first three issues, we would be grateful if you complete this questionnaire. None of the questions is difficult and all information will be treated in confidence. Please tick the boxes or write your answer in the space provided.

7 Do you buy any software? yes/no

What types?.....

From where?.....

How much do you spend each month?.....

8 Do you have a special monitor or television? yes/no

9 For what do you use the Sinclair computer?.....

.....

What other uses do you intend to make of it?.....

.....

10 Are you a member of a computer club? yes/no

Is it at school or private?.....

11 How long have you read *Sinclair User*?.....

Where do you obtain it?.....

What do you like about it.....

.....

.....

What do you not like?.....

.....

How could it be improved?.....

.....

12 What other computer magazines do you read?

Personal Computer World ☐ *Computer and Video Games* ☐ *Your Computer* ☐ *Practical Computing* ☐

Microcomputer Printout ☐ *Windfall* ☐ *Educational Computing* ☐ *Microdecision* ☐

Which Micro? ☐ *ZX Computing* ☐ *Sinclair Programs* ☐ *Popular Computing Weekly* ☐

Computer Today ☐

Any other? State which......

- Plug in — no desoldering.
- Space bar linked to space key.
- Full travel keys. Six spare keys for your own use.
- Case available to hold keyboard and ZX 81 microcard.
- 16K RAM pack clamp supplied with case to eliminate white outs!!

THE PROFESSIONAL ZX81 KEYBOARD

- All-you-need Keyboard Kit £28.95.
- Case only £15.00.

All prices inclusive of VAT, postage and packing.
Please allow 21 days for delivery.

COMPUTER KEYBOARDS DIV.
DEAN ELECTRONICS LIMITED
Glendale Park Fernbank Road Ascot Berkshire England
Dial-a-leaflet 03447 5661 Telex 849242

SILVERSOFT

personal computer software

ZX81/16K SOFTWARE

☐ **"STARTREK" £4.95**
16K STARTREK: Exciting space adventure game including klingons starbases, phasors, 8×8 galaxy, 4-levels of play, long and short range scanners, etc.

☐ **"SUPER-WIMPUS" £4.95**
16K SUPER WUMPUS: Can you hunt and catch the mysterious wumpus in his underground labyrinth? Intriguing underground adventure.

☐ **"GRAPHIC—GOLF" £4.95**
16K GRAPHIC GOLF: Try out your golfing expertise, on the computer's golf course, 18-different graphically display holes. Hazards, include lakes, trees, wind, rough etc.

☐ **"GAMES PACK 1" £4.95**
16K GAMES PACK 1: Fantastic value for money, nearly 50K of programs on one cassette. Five games including "Real Time Graphic" Lunar Lander, Starwars, Hammurabi, Minefield, Mastermind.

☐ **ZX-ZOMBIES" £4.95**
16K ZX-ZOMBIES: Can you escape the manrauding, non-eating ZX-ZOMBIES as the chase you for your FLESH!!! Eight rounds of play, highly addictive.

ZX-ARCADE ACTION

☐ **NEW!! "MUNCHER!!" £5.95**
At last Pacman for your ZX-81, all the arcade features plus!? software for the QS character board.

☐ **"SPACE-INVADERS" £4.95**
Simply the best yet, the closest thing to real Invaders on the ZX81. Full arcade features! including 1 or 2 player option and software to drive the QS character-board.

☐ **"ASTEROIDS" £5.95**
Authentic representation of the arcade game including L, R, thrust and fire controls, 5-levels of play and alien spaceships.

☐ **"DROPOUT" £5.95**
Exciting NEW arcade game. Can you destroy the aliens before they build up in their atomic plies and overwhelm you.

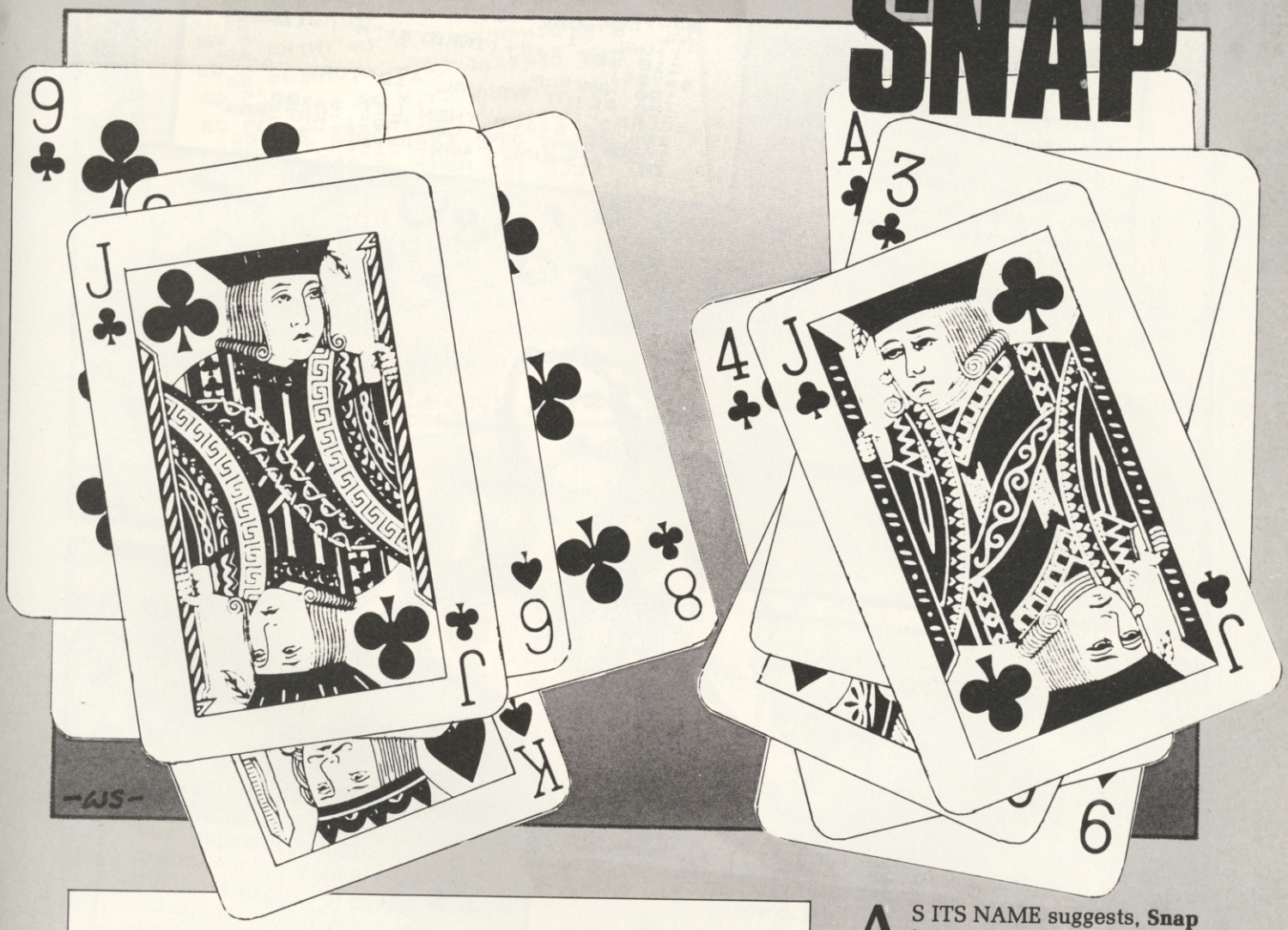
Dealers enquires welcome, generous discounts.
When ordering 2 or more deduct £1.00. Send S.A.E. for Catalogue.
Tick boxe(s) required.
Cheques/POs payable to "SILVERSOFT".
Name .....
Address .....
.....

WANTED ZX81, Spectrum. BBC Micro Software
Excellent Royalties — S.A.E. for details.
All Arcade games run in 4K

SILVERSOFT (Dep. SU7)
35 Bader Park, Bowerhill,
Melksham, Wiltshire.

PROGRAM PRINTOUT

SNAP




```
 10 LET P=0
 20 LET Q=P
 30 LET A$=""
 40 FOR C=1 TO 50
 50 LET B$=A$
 60 LET A=INT (RND*3)
 70 IF A=0 THEN LET A$="CLUB "
 80 IF A=1 THEN LET A$="BAR  "
 90 IF A=2 THEN LET A$="CHERRY"
100 LET B=6
110 IF INT (C/2)<>INT (C/2) THEN
LET B=18
120 PRINT AT 10,0,B;A$
130 FOR F=1 TO 30
140 NEXT F
150 IF A$<>B$ THEN GOTO 200
160 LET C$=INKEY$
170 IF C$="Q" THEN LET Q=Q+1
180 IF C$="P" THEN LET P=P+1
190 PRINT AT 0,3;"<";Q;">";AT 0
21;"<";P;"P"
200 IF INKEY$<>"" THEN GOTO 200
210 NEXT C
```

AS ITS NAME suggests, **Snap** is a version of the well-known card game but instead of cards the program has three words, 'club', 'bar' and 'cherry' which appear in random order on two sides of the screen.

When two words are the same, the two players have to press their keys, either Q or P, as quickly as possible, to score a point.

The game lasts for four attempts, and the score for each player is displayed at the top of the screen.

It is a simple game but can be fitted into 1K RAM and is one of the few games of this size which can be played by two players.

Snap was sent by Tim Crossley of York.

NUMBER CRUNCHER

NUMBER CRUNCHER is an interesting game which can fit on the basic 1K version of the ZX-81. It is another variation on the many slalom-type games.

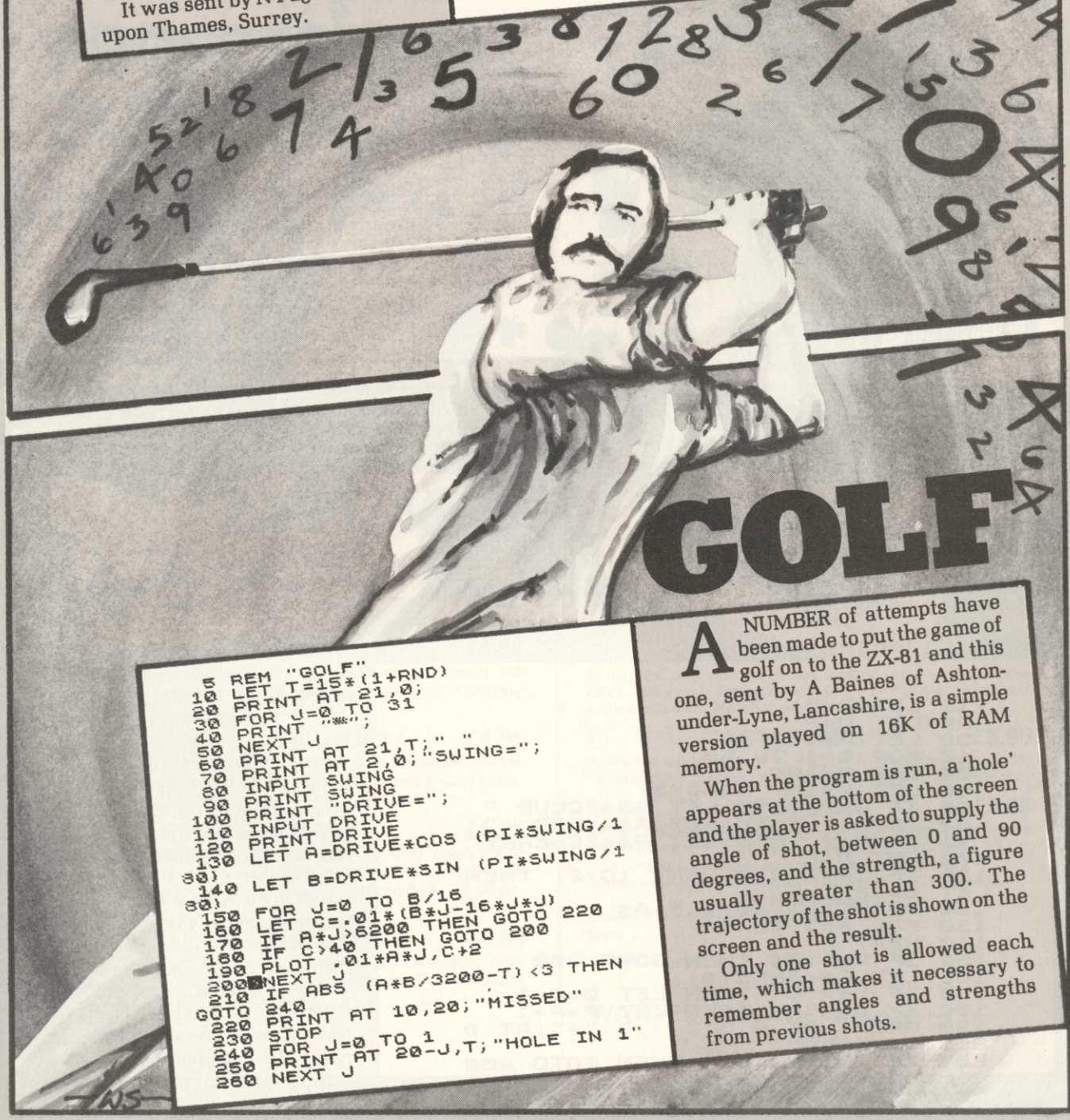
As the name indicates, the 'obstacles' are made up of numbers of random value and position on a path. The aim is to make as high a score as possible.

The cursor moves automatically down the path and is shifted to the left using the 'Z' key and to the right by the 'M' key.

After a certain length of time the game stops and the score, plus a rating, is displayed.

It was sent by N Page of Kingston upon Thames, Surrey.

```
   5 LET A$="PEEK (PEEK 16396+25
6*PEEK 16399)"
  10 LET X=VAL "13"
  15 LET S=PI-PI
  50 FOR F=1 TO VAL "75"
  55 SCROLL
  60 PRINT AT 0,X;
  65 LET Q=VAL A$
  70 PRINT "■";
  75 IF Q<VAL "29" OR Q>VAL "38"
THEN GOTO VAL "100"
  80 LET S=S+Q-VAL "28"
 100■PRINT AT VAL "11",VAL "9";"
■SEVEN SPACES■";AT VAL "11",RND*
VAL "6"+VAL "10";INT (RND*VAL "9
")+VAL "1"
 110 LET X=X+(INKEY$="M")-(INKEY
$="Z")
 120 NEXT F
 150 PRINT AT VAL "12",VAL "9";"
SCORE=";S
 155 IF S<100 THEN LET S=100
 160■PRINT TAB VAL "9";"RATING="
;INT ((S-VAL "100")/VAL "10")
```



GOLF

```
  5 REM "GOLF"
 10 LET T=15*(1+RND)
 20 PRINT AT 21,0;
 30 FOR J=0 TO 31
 40 PRINT "■";
 50 NEXT J
 60 PRINT AT 21,T;" "
 70 PRINT AT 2,0;"SWING=";
 80 INPUT SWING
 90 PRINT SWING
100 PRINT "DRIVE=";
110 INPUT DRIVE
120 PRINT DRIVE
130 LET A=DRIVE*COS (PI*SWING/1
80)
140 LET B=DRIVE*SIN (PI*SWING/1
80)
150 FOR J=0 TO B/16
160 LET C=.01*(B*J-16*J*J)
170 IF A*J>6200 THEN GOTO 220
180 IF C>40 THEN GOTO 200
190 PLOT .01*A*J,C+2
200■NEXT J
210 IF ABS (A*B/3200-T)<3 THEN
GOTO 240
220 PRINT AT 10,20;"MISSED"
230 STOP
240 FOR J=0 TO 1
250 PRINT AT 20-J,T;"HOLE IN 1"
260 NEXT J
```

A NUMBER of attempts have been made to put the game of golf on to the ZX-81 and this one, sent by A Baines of Ashton-under-Lyne, Lancashire, is a simple version played on 16K of RAM memory.

When the program is run, a 'hole' appears at the bottom of the screen and the player is asked to supply the angle of shot, between 0 and 90 degrees, and the strength, a figure usually greater than 300. The trajectory of the shot is shown on the screen and the result.

Only one shot is allowed each time, which makes it necessary to remember angles and strengths from previous shots.

BUG BAITER

```
  5 LET S=PI-PI
  7 LET Z=PI-PI
 10 LET A=PI-PI
 20 LET B=PI-PI
 30 LET M=PI-PI
 40 LET N=31
 43 LET X=21
 44 LET Y=PI-PI
 50 LET P=INT (RND*21)
 60 LET Q=INT (RND*31)
 65 LET R=P+PI/PI
 70 PRINT AT A,B;"+"
 72 PRINT AT P,Q;"GRAPHIC SHIFT
ED H"
 74 PRINT AT R,Q;"GRAPHIC SHIFT
ED H"
 80 PRINT AT M,N;"GRAPHIC SHIFT
ED P"
 90 PRINT AT X,Y;"GRAPHIC SHIFT
ED P"
 95 LET S=S+PI/PI
100 LET A$=INKEY$
110 IF A$="8" THEN LET B=31
120 IF A$="5" THEN LET B=PI-PI
130 IF A$="6" THEN LET A=21
140 IF A$="7" THEN LET A=PI-PI
150 LET M=M+(M<A)-(M>A)
160 LET N=N+(N<B)-(N>B)
170 LET X=X+(X<A)-(X>A)
180 LET Y=Y+(Y<B)-(Y>B)
190 IF P=M AND Q=N OR P=X AND Q
=Y OR R=M AND Q=N OR R=X AND Q=Y
 THEN GOTO VAL "300"
195 IF A=M AND B=N OR A=X AND B
=Y THEN STOP
200 CLS
210 GOTO VAL "70"
300 LET Z=Z+PI/PI
310 PRINT ;"HIT"
315 PAUSE 50
320 IF Z=2 THEN GOTO VAL "70"
330 PRINT ;"DEAD IN:";S
```

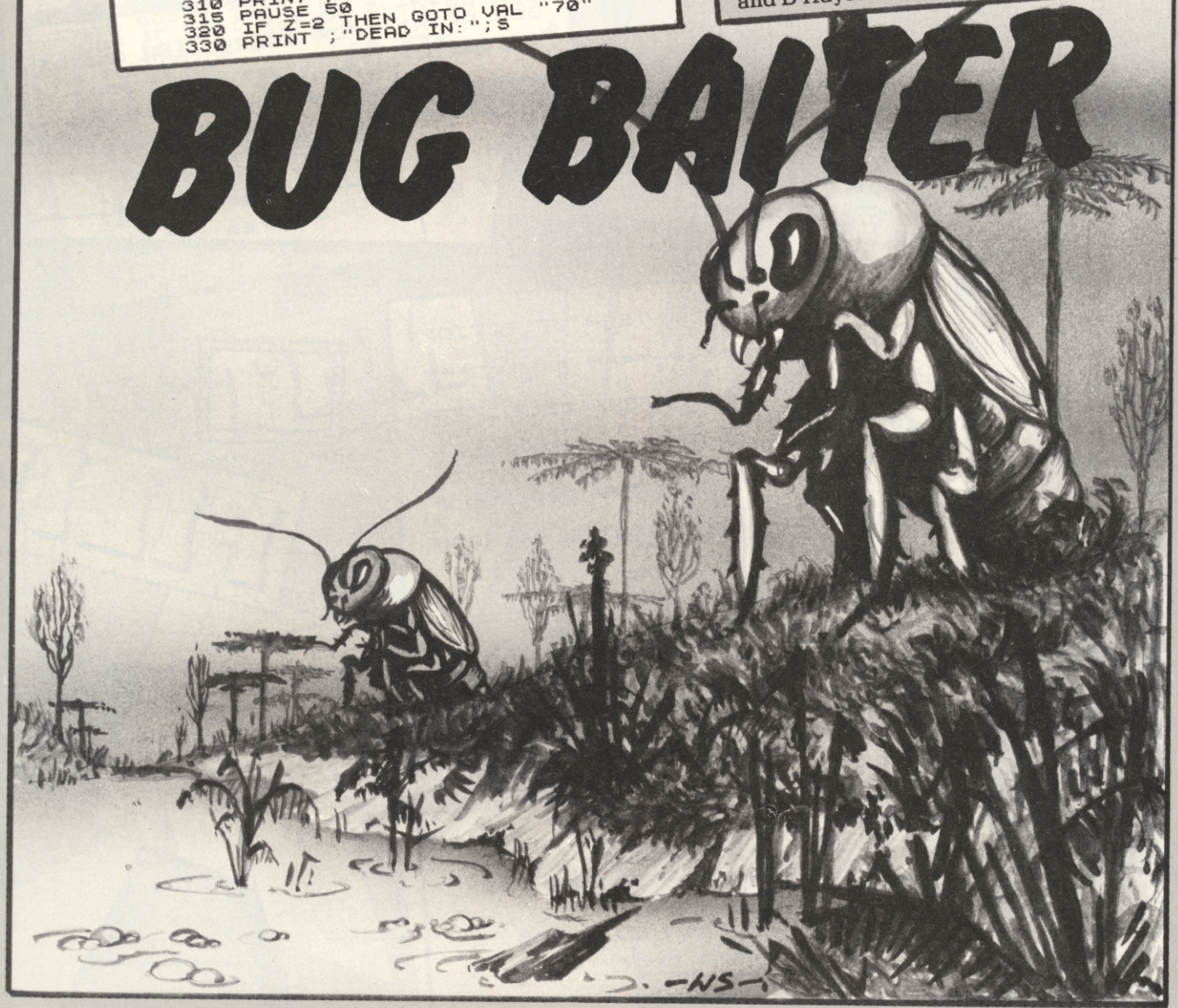
BUG BAITER is not a took-kit for attracting bugs in programs to emerge with their hands up but a game in which the aim is to tempt bugs to fall into a swamp.

To start the game, press RUN, and the swamp is shown in one part of the screen with two bugs at random positions and a plus sign in one corner. The plus sign is the bait towards which the bugs move.

The game involves moving the plus sign from corner to corner, using the cursor keys above 5 to 8 so that the bugs fall into the swamp. Once one of the bugs falls in, the game stops and the length of time taken is shown.

If you wish to continue with the same lay out, press the CONT key. If you want a new game, press RUN.

The game was sent by M Archer and D Hayes of Godalming, Surrey.



FILING

THE NUMBER of entries for our May competition proved that as many people are using their ZX-81s for serious uses as for games. The variety of applications was wide and all were of a very high standard.

That made the task of the judges difficult once more but the eventual winner was John Fletcher, of Humberstone, Leicester, who submitted a system which files and retrieves information. He uses it to help keep track of 1,000 photographic slides, with each slide being described by six two-letter codes. It is possible to obtain lists of slides which have up to three codes in common.

Fletcher said he had bought the ZX-81 with the intention of producing such a system. He and his wife had so many slides, which are used to illustrate lectures, that it was difficult to sort them.

He was able to write the program, listed here, after having the machine for only three months.

"I have always been interested in computers and learned how to use the ZX-81 very quickly," he said.

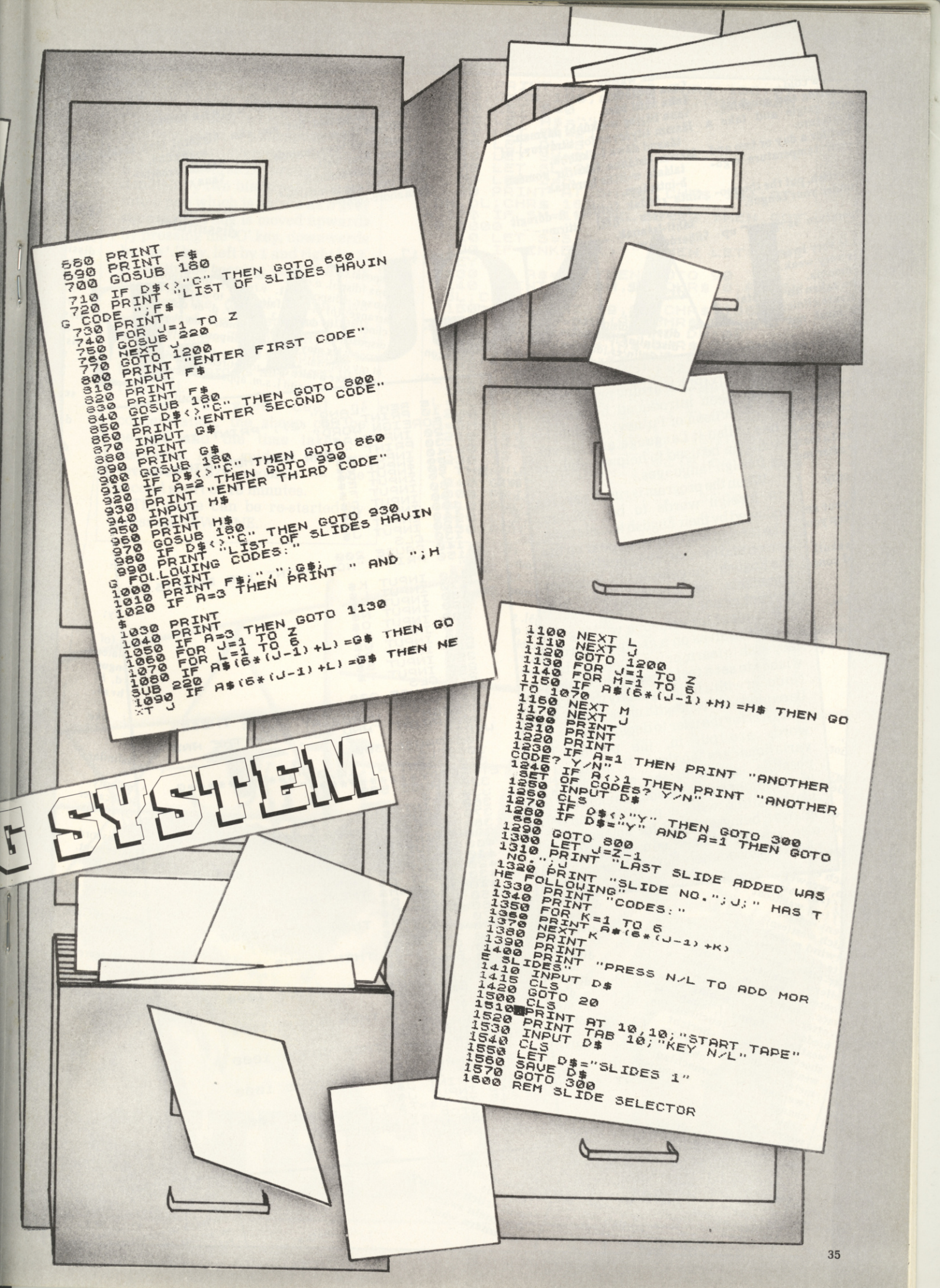
He added that LOADing and SAVEing time was five minutes but that was nothing compared to the time needed previously to sort through the slides.

The system is very general and can be used for other types of filing.

```
  3 REM SLIDE SELECTOR
  5 REM BY JOHN R. FLETCHER
  7 FAST
 10 DIM A$(6000,2)
 15 LET Z=1
 20 FOR J=Z TO 1000
 30 FOR K=1 TO 6
 40 PRINT "KEY IN CODES FOR SLI
DE NO.";J
 50 PRINT
 60 PRINT
 70 PRINT "CODE NO.";K
 80 INPUT A$(6*(J-1)+K)
 90 PRINT A$(6*(J-1)+K)
100 GOSUB 130
110 IF D$<>"C" THEN GOTO 40
120 NEXT K
130 PRINT "ARE THERE ANY MORE S
LIDES? Y/N"
140 INPUT D$
150 CLS
160 IF D$="Y" THEN NEXT J
165 LET Z=J+1
170 GOTO 300
180 PRINT AT 15,1;"KEY C IF THI
S IS OK, OTHERWISE  NEWLINE"
190 INPUT D$
200 CLS
210 RETURN
220 FOR K=1 TO 6
230 IF A$(6*(J-1)+K)=F$ THEN PR
INT J;" ";
240 IF A$(6*(J-1)+K)=F$ THEN NE
XT J
250 NEXT K
260 RETURN
300 PRINT "
PROGRAM "          SLIDE EXTRACTION
320 PRINT
330 PRINT "FOR INDIVIDUAL SLIDE
      KEY 0"
340 PRINT
```

```
350 PRINT "FOR 1-TERM SELECTION
      KEY 1"
360 PRINT
370 PRINT "FOR 2-TERM SELECTION
      KEY 2"
380 PRINT
390 PRINT "FOR 3-TERM SELECTION
      KEY 3"
400 PRINT
410 PRINT "FOR ADDING MORE SLID
ES
      KEY 4"
420 PRINT
422 PRINT "FOR SAVING PROGRAM
      KEY 8"
424 PRINT
430 PRINT "FOR CHANGING PROGRAM
      KEY 9"
440 INPUT A
450 CLS
460 IF A=0 THEN GOTO 500
470 IF A=1 THEN GOTO 660
480 IF A=4 THEN GOTO 1300
485 IF A=5 THEN GOTO 1500
490 IF A=9 THEN LIST
495 GOTO 800
500 PRINT "KEY IN SLIDE NO."
510 INPUT J
520 CLS
530 PRINT "SLIDE NO.";J;" HAS T
HE FOLLOWING"
540 PRINT "CODES:"
550 PRINT
560 FOR K=1 TO 6
570 PRINT A$(6*(J-1)+K)
580 NEXT K
590 PRINT
600 PRINT
610 PRINT "ANOTHER SLIDE? Y/N"
620 INPUT D$
630 CLS
640 IF D$="Y" THEN GOTO 500
650 GOTO 300
660 PRINT "ENTER CODE"
670 INPUT F$
```

-WS-



```
550 PRINT
590 PRINT F$
700 GOSUB 180
710 IF D$<>"C" THEN GOTO 660
720 PRINT "LIST OF SLIDES HAVIN
G CODE ";F$
730 PRINT
740 FOR J=1 TO Z
750 GOSUB 220
760 NEXT J
770 GOTO 1200
800 PRINT "ENTER FIRST CODE"
810 INPUT F$
820 PRINT
830 PRINT F$
840 GOSUB 180
850 IF D$<>"C" THEN GOTO 800
860 PRINT "ENTER SECOND CODE"
870 INPUT G$
880 PRINT
890 PRINT G$
900 GOSUB 180
910 IF D$<>"C" THEN GOTO 860
920 IF A=2 THEN GOTO 990
930 PRINT "ENTER THIRD CODE"
940 INPUT H$
950 PRINT
960 PRINT H$
970 GOSUB 180
980 IF D$<>"C" THEN GOTO 930
990 PRINT "LIST OF SLIDES HAVIN
G FOLLOWING CODES:"
1000 PRINT
1010 PRINT F$;",";G$;
1020 IF A=3 THEN PRINT " AND ";H
$
1030 PRINT
1040 PRINT
1050 IF A=3 THEN GOTO 1130
1060 FOR J=1 TO Z
1070 FOR L=1 TO 6
1080 IF A$(6*(J-1)+L)=G$ THEN GO
SUB 220
1090 IF A$(6*(J-1)+L)=H$ THEN NE
XT J
```

```
1100 NEXT L
1110 NEXT J
1120 GOTO 1200
1130 FOR J=1 TO Z
1140 FOR M=1 TO 6
1150 IF A$(6*(J-1)+M)=H$ THEN GO
TO 1070
1160 NEXT M
1170 NEXT J
1200 PRINT
1210 PRINT
1220 PRINT
1230 IF A=1 THEN PRINT "ANOTHER
CODE? Y/N"
1240 IF A<>1 THEN PRINT "ANOTHER
SET OF CODES? Y/N"
1250 INPUT D$
1260 CLS
1270 IF D$<>"Y" THEN GOTO 300
1280 IF D$="Y" AND A=1 THEN GOTO
550
1290 GOTO 800
1300 LET J=Z-1
1310 PRINT "LAST SLIDE ADDED WAS
NO.";J
1320 PRINT "SLIDE NO.";J;" HAS T
HE FOLLOWING"
1330 PRINT "CODES:"
1340 PRINT
1350 FOR K=1 TO 6
1360 PRINT A$(6*(J-1)+K)
1370 NEXT K
1380 PRINT
1390 PRINT
1400 PRINT "PRESS N/L TO ADD MOR
E SLIDES"
1410 INPUT D$
1415 CLS
1420 GOTO 20
1500 CLS
1510 PRINT AT 10,10;"START TAPE"
1520 PRINT TAB 10;"KEY N/L."
1530 INPUT D$
1540 CLS
1550 LET D$="SLIDES 1"
1560 SAVE D$
1570 GOTO 300
1600 REM SLIDE SELECTOR
```

G SYSTEM

LANGUAGE

A SIMPLE learning program has been introduced by Andrew Wilson of Putney, London. He has called it **Language** and his version can be used to help vocabulary in foreign languages.

When the program is run, it asks for 10 foreign words to be typed-in, followed by their English translations. The foreign words then appear on the screen and the user is required to insert the English equivalents; the program comments on whether they are correct or not.

It is ideal for someone wishing to test themselves on a group of words they wish to learn, or for someone who wishes to set a test for someone else. No doubt with a little ingenuity it could be extended to cope with more words.

As it is for the user to decide which words are put in, the possible variations are endless. It is also possible to extend the system to involve other subjects, such as simple mathematics with a problem and answer being entered for someone else whose efforts can then be checked immediately by the program.

```
  5 REM "LANG"
 10 PRINT TAB (2); "PRINT IN YOU
R FOREIGN WORD"
 20 INPUT A$
 30 PRINT "AND ANOTHER NINE."
 40 INPUT B$
 50 INPUT C$
 60 INPUT D$
 70 INPUT E$
 80 INPUT F$
 90 INPUT G$
100 INPUT H$
110 INPUT I$
120 INPUT J$
130 CLS
140 PAUSE 200
150 PRINT "NOW PRINT THE ENGLIS
H"
160 INPUT K$
170 INPUT L$
180 INPUT M$
190 INPUT N$
200 INPUT O$
210 INPUT P$
220 INPUT Q$
230 INPUT R$
240 INPUT S$
250 INPUT T$
260 CLS
270 PAUSE 200
280 PRINT "NOW I'LL FIRE THESE
FOREIGN" WORDS AT YOU "
290 PRINT "AND YOU GIVE THE ANS
WERS"
300 PAUSE 300
305 CLS
310 PRINT AT 10,0;"**********G
ET READY**********"
320 PAUSE 500
330 CLS
340 PRINT A$
350 INPUT A$
360 IF A$=K$ THEN GOSUB 1000
370 PRINT B$
380 INPUT B$
390 IF B$=L$ THEN GOSUB 1000
400 PRINT C$
410 INPUT C$
420 IF C$=M$ THEN GOSUB 1000
430 PRINT D$
440 INPUT D$
450 IF D$=N$ THEN GOSUB 1000
460 PRINT E$
470 INPUT E$
480 IF E$=O$ THEN GOSUB 1000
490 PRINT F$
500 INPUT F$
510 IF F$=P$ THEN GOSUB 1000
520 PRINT G$
530 INPUT G$
540 IF G$=Q$ THEN GOSUB 1000
550 PRINT H$
560 INPUT H$
570 IF H$=R$ THEN GOSUB 1000
580 PRINT I$
590 INPUT I$
600 IF I$=S$ THEN GOSUB 1000
610 PRINT J$
620 INPUT J$
630 IF J$=T$ THEN GOSUB 1000
640 STOP
645 PRINT "CORRECT"
650 RETURN
1000 RETURN
```

FROM Daniel Shavick of Mill Hill, London, **Sheepdog** — a difficult game which is a good representation of a sheepdog trial.

A sheep, an inverse S, is driven by a dog, an inverse D, through a gate, denoted by two black squares, and into a pen which is shown as a grey square. The dog is moved upwards by pressing the 'O' key, downwards by the '.' key, left by 1 and right by 3. It continues moving until the S is pressed.

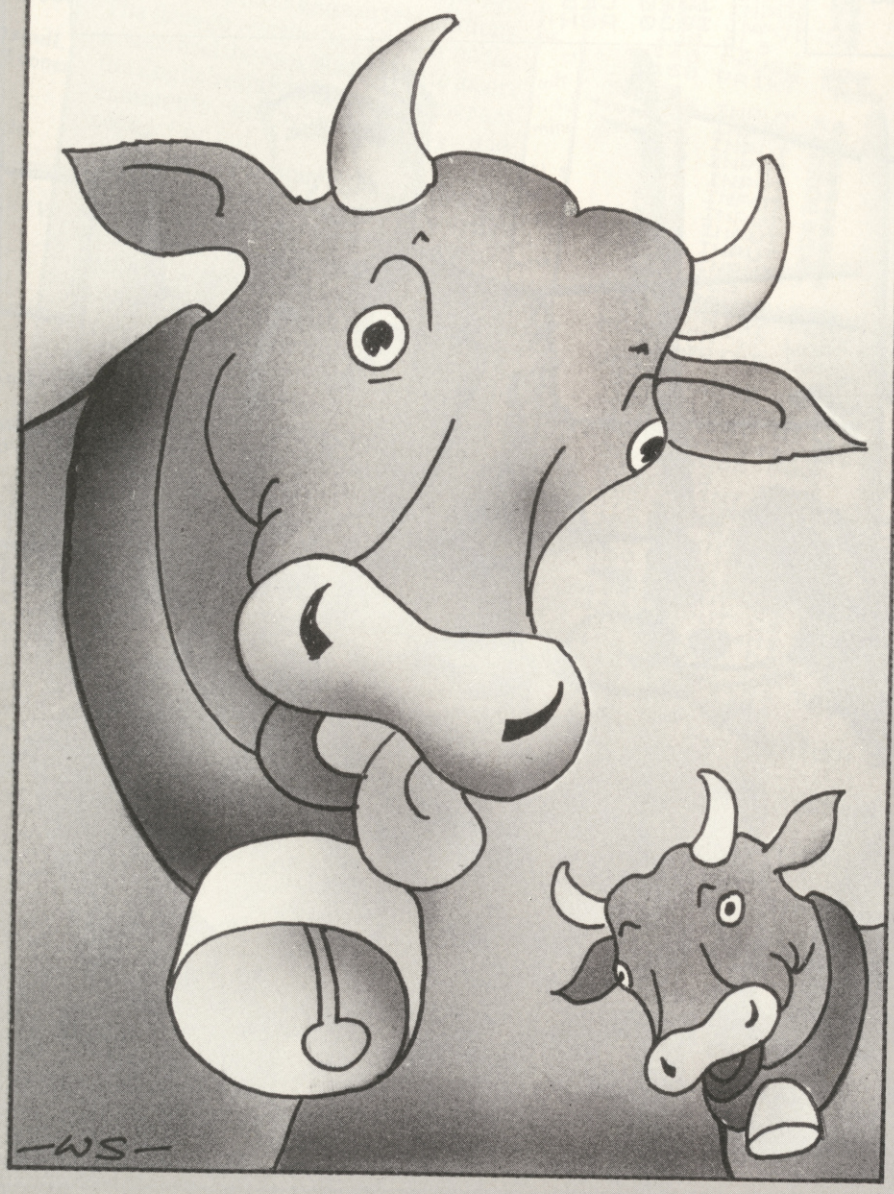
When the dog is within five squares of the sheep, the sheep begins to move. The difficulty is that the movement of the sheep tends to be as wayward as any sheep in a real trial.

After a good deal of concentration, the sheep can be penned and the time taken is displayed. As a guide it took our reviewer 1,079 seconds — one second short of 18 minutes.

The game can be re-started by pressing NEW LINE.

```
  10 PRINT AT 19,29;CHR$ 136;AT
10,5;CHR$ 128;AT 10,11;CHR$ 128
  20 LET S=0
  30 LET A$=""
  40 LET DH=21
  50 LET DL=5
  60 LET SH=5
  70 LET SL=25
  80 LET Z=5
  90 PRINT AT SH,SL;CHR$ 184;AT
DH,DL;CHR$ 169
 100 IF SH=19 AND SL=29 THEN GOT
O 1000
 110 LET S=S+1
 120 IF INKEY$<>"" THEN LET A$=I
NKEY$
 130 IF A$="" THEN GOTO 90
 140 PRINT AT DH,DL;CHR$ 0;AT SH
,SL;CHR$ 0
 150 PRINT AT 19,29;CHR$ 136
 160 LET DH=DH+(A$=CHR$ 27 AND D
H<21)-(A$=CHR$ 52 AND DH>0)
 170 LET DL=DL+(A$=CHR$ 31 AND D
L<31)-(A$=CHR$ 29 AND DL>0)
 180 IF ABS (SH-DH)>=Z OR ABS (S
L-DL)>=Z THEN GOTO 90
 190 IF ABS (DL-SL)<Z THEN LET S
L=SL+(SL>DL)-(SL<DL)
 200 IF ABS (DH-SH)<Z THEN LET S
H=SH+(SH>DH)-(SH<DH)
 210 LET SH=SH+(SH<1)-(SH>20)
 220 LET SL=SL+(SL<1)-(SL>30)
 230 IF SH=10 AND (SL<6 OR SL>10
) THEN LET SH=SH-1
 240 GOTO 90
1000 PRINT AT 21,0;S;" SECONDS"
1010 PAUSE 4E4
1020 CLS
1030 RUN
```

BULLS & COWS



WE INCLUDE a special program for users of the ZX-80. It is a version of the well-known game of **Mastermind**, where four numbers are picked at random by the program and the player has a limited number of attempts in which to guess the numbers.

To guide the player, the program marks each attempt by bulls and cows. A bull denotes a correct number in the proper position in the sequence and a cow means that the number is correct but in the wrong place.

The game continues until the correct number is guessed or the player has had 15 attempts. Press RUN for another number to be guessed.

Bulls and Cows was sent by G Gill of Westerham, Kent.

```
 10 Dim N (4)
 20 FOR A = 1 TO 4
 30 LET N(A) = RND (9)
 40 NEXT A
 45 FOR A = 1 TO 4
 50 FOR C = 1 TO 4
 60 IF A = C THEN GOTO 100
 70 IF N(A) = N(C) THEN GOTO 20
100 NEXT C
110 NEXT A
120 LET A = N(1) *1000 + N(2)
    *100 + N(3) *10 + N(4)
130 PRINT "ENTER YOUR GUESS"
135 FOR F = 1 TO 15
140 INPUT B$
141 IF B$ = " " THEN GOTO 360
142 PRINT B$ ;" = ";
143 LET B = 0
144 LET C = 0
150 LET A$ = STRI$ (A)
160 LET X$ = A$
165 LET C$ = B$
180 FOR S = 1 TO 4
190 FOR D = 1 TO 4
200 IF CODE(X$) = CODE(C$) THEN
    GOSUB 400
210 LET C$ = TL$(C$)
220 NEXT D
225 LET C$ = B$
230 LET X$ = TL$(X$)
240 NEXT S
250 IF B = 4 THEN GOTO 350
260 PRINT B; "BULLS"; C; "COWS"
270 NEXT F
280 PRINT "I'LL TELL YOU THAT
    IT WAS"; A
350 PRINT "THAT'S IT"
360 STOP
400 IF S = D THEN LET B = B + 1
410 IF NOT S = D THEN LET C = C + 1
420 RETURN
```

● Because of the large number of programs which have been sent to us, we cannot acknowledge everything which we receive. If you have not heard from us within one month of despatch, it is unlikely that we will be using your submission.

ZX81 users

I need more memory! please rush me the fully assembled, tested and guaranteed 'BYG BYTE'

16K RAM PACK

Name .....

Address .....

Make all cheques & PO's payable to:-
Phoenix Marketing, Oaklands House Solartron Road, Farnborough, Hants. Tel: (0252) 514990

FULLY INCLUSIVE PRICE

DEPT. SU

£25.00

PERSONAL SOFTWARE SERVICES

ESSENTIAL PROGRAMS

ALL YOU NEED TO SIMPLIFY COMPLEX PROGRAMMING

1/0 ENHANCED BASIC 16k — **£6.95**

A MUST FOR ALL SERIOUS PROGRAM WRITERS ENHANCED BASIC IS STORED ABOVE RAMTOP AND SO ALLOWS YOU TO OPERATE ON OTHER PROGRAMS. SOME OF ITS MANY FEATURES INCLUDE: AUTO-RENUMBERING (INCLUDING ALL GOTO'S + GOSUB'S), BLOCK DELETION OF ANY PART OF A PROGRAM + DISPLAY OF THE AMOUNT OF MEMORY USED. SAVES HOURS OF TEDIOUS PROGRAMMING.

1/1 ZX-COMPILER 16K — **£6.95**

AUTOMATICALLY TRANSLATES A LARGE SUBSET OF BASIC INTO MACHINE CODE WHICH IS THEN STORED IN A REM STATEMENT FOR USE AS A SUBROUTINE IN ANY PROGRAM YOU WRITE. OPERATES ON 35 OF THE MOST VALUABLE SINCLAIR BASIC COMMANDS INCLUDING PRINT, CONDITIONALS, POKE, GOTO, GOSUB, FOR LOOPS ETC ETC.

1/2 GRAFIX 16K — **£5.95**

ESSENTIAL FOR THOSE WHO NEED COMPLEX IMAGES IN THEIR PROGRAMS. SUPERBLY EASY TO USE. WHEN YOUR DESIGN IS COMPLETE IT CAN EASILY BE INCOPORATED INTO OTHER PROGRAMS. IMAGES CAN BE STORED + RECALLED AT ANY TIME, REFLECTED (IE MIRROR IMAGE) + MIXED TOGETHER. YOU CAN CHANGE THE "COLOUR" + PRODUCE INVERSE VIDEO IMAGE. SIMPLY THE MOST FLEXIBLE IMAGE PROCESSOR AVAILABLE.

SPECIAL OFFER: BUY ANY TWO PROGRAMS FOR ONLY £11.50 OR ANY THREE FOR £15.00.
THE ABOVE PROGRAMS ARE ONLY A SMALL SELECTION FROM OUR WIDE RANGE OF ZX81 SOFTWARE – ALL OF WHICH IS AVAILABLE THROUGH THE ZX SOFTWARE LIBRARY – SAE FOR FULL DETAILS.

CHEQUE OR P/O TO: PSS, 112 OLIVER STREET, COVENTRY, CV6 5FE

OPENING SHORTLY

A retailer for Sinclair accessories in the Yorkshire/Lancashire/Humberside area.

We are situated close to the M1 & M62 motorways and offering easy parking.

As well as a complete range of hard and software, our service department can repair, modify or fit a wide range of accessories.

For further details of these and many other services phone:

PHILIP COPLEY on 0924 272 545

Manufacturers of accessories looking for a retailer in our area are invited to contact us.

Hours of business:
MONDAY to SATURDAY, 10am to 8pm

MICROFEST '82'

Micro Fair and Seminar for all users
HARDWARE. SOFTWARE. PERIPHERALS.

UNIVERSITY OF MANCHESTER INSTITUTE OF SCIENCE AND TECHNOLOGY, SACKVILLE ST., MANCHESTER
SATURDAY 24 (10.30 - 21.00), SUNDAY 25 (10.30 - 18.00)
JULY 1982

10 Free draw for MICRO computer
20 Club Stands
30 Bring and Buy stall
40 Free parking
50 Review of Sinclair Spectrum
60 Lectures on small micro applications
70 Free Films
80 Bar and refreshments
90 Close to centre and Piccadilly station
100 Free Coffee
110 Facilities for the Disabled

ADMISSION:

ADULT 1.00
CHILD (under 16) 50p
(half price with coupon)

Exhibition and other diversions for ZX, B.B.C. Micro, VIC, TRS, Sharp, Sorcerer, Video Genie, Tangerine, Nascom, Atari, Pet and Acorn user.

THE
BUFFER
MICRO SHOP
(NEXT TO STREATHAM STATION)

★ ★ ★

NEW SOFTWARE SHOP EXCLUSIVELY FOR
ZX81
PROGRAMS, GAMES, "ADD/ONS"

★ ★ ★

MOST OF THE MAIL ORDER ITEMS ADVERTISED IN THIS MAGAZINE AVAILABLE OVER THE COUNTER

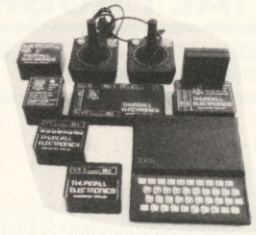
★ ★ ★

LOADING PROBLEMS? TRY OUR INTERFACE
BUSINESS & TECHNICAL DATA HANDLING PROGS.
PROPER KEYBOARDS; CONSOLES; VDUS

★ ★ ★

374A STREATHAM HIGH ROAD,
LONDON SW16
Tel: 01- 769 2887
S.A.E. APPRECIATED FOR CATALOGUE

ZX81 & 80 OWNERS



NEW

ACCESS TO THE OUTSIDE WORLD!
SPECIALISED PRODUCTS MODULAR — EASY TO USE FOR HOME/INDUSTRY & EDUCATION

TE10 INPUT/OUTPUT PORT — Easy to use. Fits between ZX & RAM PACK/PRINTER (if required). No skill required to connect. Can be used for such things as:- motor control; sound/music generators, connection to printers/floppy discs/light pens/other computers, temperature monitoring, square wave generating, control of rotating aerials, even train sets etc. Port has 16 programmable I/O lines and may be used without any electronics knowledge to connect other add-ons. Motherboard required ONLY when two or more add-ons are used at any one time.
KIT ASSEMBLED £17.95 KIT (WITHOUT CASE) £14.95

TE12 4 CHANNEL RELAY BOX — To suit port. Contact rating:-240v AC/1.5A — 24DC or 110v AC/3A. Up to 4 units i.e. 16 relays can be operated. £14.95.

TE15 8 WAY TRANSISTOR DRIVER — £9.95

TE17 8 WAY SWITCH UNIT (EDUCATIONAL) — £12.95

TE18 8 WAY INDICATOR UNIT (EDUCATIONAL) — £12.95

TE20 JOYSTICK & FREE GAME — (2 Joysticks may be connected via Motherboard) — £12.95

TE30 MOTHERBOARD — Allows multiples combinations of add-ons — up to16 I/O lines may be used — £15.95

TE126 POWER SUPPLY — 6/7.5/9v DC at 300 mA — required for use with add-ons TE12/15 and 18 — £4.95

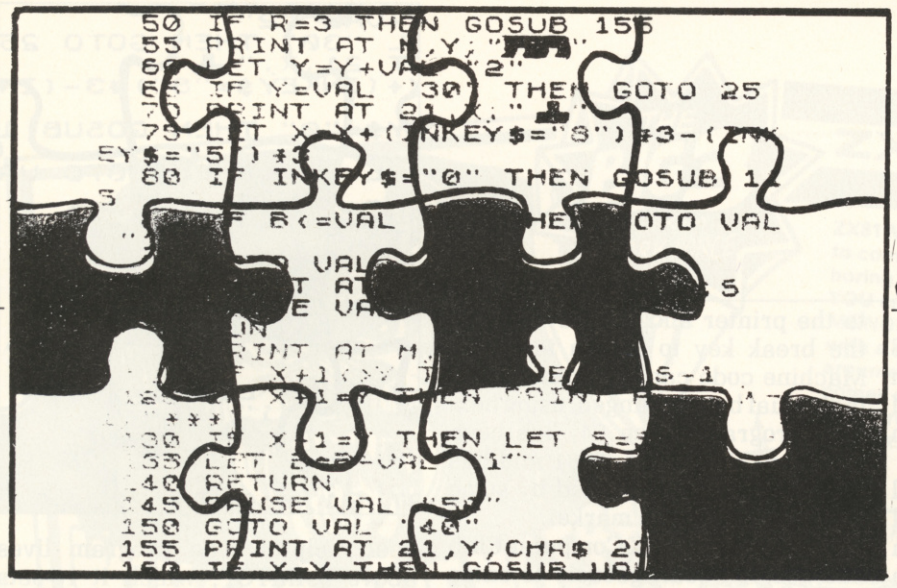
23+23 WAY ZX Edge Con £2.85 Contact cleaner £2.30
16 WAY SINGLE SIDED EDGE CON £1.95 EXTENDED P.I.O. NOTES £1

PRICES INCLUDE VAT

Receipts always provided:- Delivery normally ex-stock. ADD 50p towards p&p on all orders under £20, with the exception of accessories, e.g. Edge con. Full instructions and examples with all products.

THURNALL (ELECTRONICS) ENG.
DEPT S. 95 LIVERPOOL ROAD.
CADISHEAD. MANCHESTER M30 5BG
TEL: 061 775 4461

SEND S.A.E. FOR CATALOGUE
POSTAL OR TELEPHONE
ORDERS ACCEPTED



The popularity of writing in machine code is growing. Phil Garrett looks at the systems which can help.

Aids for speed and efficiency

JUDGING by the popularity of **Space Invader**-type arcade games for the ZX-81, and of books such as Toni Baker's *Mastering machine code on your ZX-81*, it seems the ZX-81 owners want not only to run machine code programs but write them, too. That is scarcely surprising, considering the tremendous speed and efficiency of a machine code program compared to Basic, but there is a trade-off involved.

I wrote a three-dimensional **Noughts and Crosses** program for my ZX-80 which played a good game but had a response time of 45 seconds. A year later I wrote the same program in machine code on my ZX-81 and it had a response time of less than half a second. Writing that program, however, had taken eight complete days of my summer holiday.

Broadly speaking, there are three types of program available to aid the budding machine code adventurer. The most complex and probably most useful programs are the assemblers, which convert mnemonics into machine code; then there are disassemblers which do the reverse and, finally, monitor programs which allow close examination of a machine code program as it runs, plus other functions. When Zilog produced the Z-80 microprocessor, each of its hundreds of instructions was given a mnemonic so that users could remember what a particular instruction would do. For example, LD A, H means load the Accumulator with the contents of the H register and represents 124 in machine code. The mnemonic is entirely arbitrary and could just as well have been LOAD A FROM H.

We could produce a machine code program by POKEing instructions byte by byte into RAM and plenty of machine code loader programs do just that. The method, though, is highly error-prone and time-consuming if the program is substantial. On the other hand, an assembler program converts the mnemonic form of instructions — which we can understand reasonably easily — into machine code which the microprocessor can understand and execute.

'There is a trade-off between the speed of the final program and the time taken to write it.'

In some ways the assembler program is similar to the Basic ROM in the ZX-81. The ROM scans the program for Basic keywords — LD, CALL — and then places the corresponding instruction in the RAM.

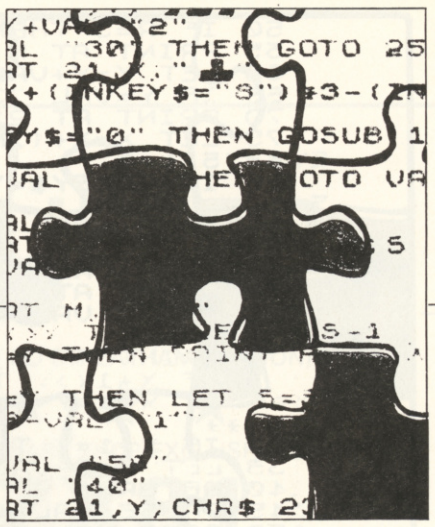
The ability to use labels makes an assembler very powerful, as it allows the programmer to refer to instruction lines, subroutines, and even data by means of symbols, rather than having to determine the addresses each time.

Sufficient of the theory; how are the ZX-81 assemblers used? Bug-Bytes ZXAS assembler is in 5K of machine code, with a few lines of Basic to operate it. The program resets RAMTOP automatically and loads itself above it, so that assembler source programs can be loaded and saved separately. Lines of mnemonics are entered in REM statements, with multiple instructions allowed, provided they are separated by semi-colons. Up to 256 labels can be used in the form :L0 to :L255, and comments may be placed after a "*". Full-stops are used instead of commas — e.g., LD A. H — which makes typing instructions easier and numbers may be entered in decimal or hex. When the assembler is run, you are prompted for the starting address for the resulting machine code. Invariably I use a REM statement at the start of the program, and compile the machine code from 16514. The assembler code is then displayed on the screen in the format source line number; address (in hex); opcode and data (in hex); Z-80 mnemonic. If there is an error, the assembler stops with an error code, so it is not difficult to build a syntactically-correct source program.

There is at least one bug in ZXAS; the SUB A,n instruction does not work but it can be replaced by AND A; SBC A,n which does the same. ZXAS is a remarkable program and is excellent value at £5.

The only other ZX-81 assembler I have encountered is produced by

continued on page 42



continued from page 41

ACS Software. It is similar to ZXAS in size and operation, with instructions entered in REM statements and labels available in the form Q.1: Q.255:.

Data must be entered in decimal rather than hex — I prefer decimal — and there is a useful DFB function which allows you to specify the contents of a particular byte during assembly, so you can have messages embedded in your machine code.

The assembled listing display is slightly different from ZXAS; you are given the decimal address, hex opcode and data, and then the mnemonic.

The ACS assembler is also excellent value at £5.50 and the use of either this program or ZXAS is the single biggest step to proficiency in machine code programming.

Neither program sets out to teach assembler, so a book will also be needed. I use the thorough but expensive *Programming the Z-80* by Rodney Zaks but there are now several books available specifically for machine code programming on the ZX-81.

Disassemblers convert machine code into mnemonics, making it easier to analyse and amend. The ACS disassembler can be used at the same time as its assembler and provides mnemonic listings in the same format. All addresses are shown in decimal and destination addresses are shown for relative jumps rather than the displacement, which is an excellent idea.

All the other disassemblers have additional bells and whistles to assist with editing and debugging machine code. Campbell Systems 4K disassembler uses plenty of Basic and its machine code occupies my favourite 16514 onwards area of RAM. It has a handy facility to step backwards and displays contents in hex, with addresses and mnemonics in decimal. You cannot dump direct to the printer and you have to use the break key to return to Basic. Machine code can be entered, and individual bytes changed, using hex. This program, price £4, has been available since June, 1981 and has perhaps been superceded by some of the others on the market.

The Aylesbury ZX Computer Club has decided courageously to enter the software fray with its disassembler. It is a very large program (14K) and runs a little slower than the others. The display, which can go to screen, printer, or both, is unusual; addresses, contents and mnemonic data are given in both hex and decimal and the display allows one line for each byte. There is also a facility to enter machine code from address 30000 in either hex or decimal and an Edit function to alter a byte or copy a block of bytes from one area of RAM to another. It is good value at £3.50 plus 50 pence for postage and packing.

Bug-Bytes **ZXDB** disassembler can be used in conjunction with its ZXAS assembler and occupies 4K from address 16514. It works entirely in hex and does not dump to the printer, although you can circumvent that by disassembling 12 lines or so, then calling 0869H, which is the Sinclair ROM COPY subroutine.

Another disadvantage is that some of the mnemonics belong to the 8080 rather than the Z-80, e.g., LD A, (HL) appears as LD A,M. It has a very large number of sophisticated monitor functions, so I have included it among the monitors as well. ZXDB costs £6.50.

MicroGen **Debug** is also a disassembler with some monitor functions, works entirely in hex, and can be used with a printer. Care has to be taken when transferring from Basic to Debug and back, or the ZX-81 will crash. I found the monitor display impressive, although more detailed instructions would have been helpful. The program lives above RAMTOP, which it re-sets automatically, and costs £3.95.

ACS-Debug can be used in conjunction with the ACS assembler and disassembler to provide a complete, if rather expensive, machine code writing package. It stores above RAMTOP, uses decimal numbers only, and does not dump to the printer. Once again, it costs £5.50.

The Picturesque **ZX-MC** is another sophisticated monitor; it is rather like a separate operating system. You cannot use it with any existing machine code programs, as it uses low memory and has its own stack in high memory. It has its own loading and saving routines which operate at twice the speed of the ZX-81. The program is complete with a comprehensive manual for £7.50 but I believe its incompatibility with other programs is a serious disadvantage.

The Taurus **Machine Code Monitor** is placed above RAMTOP and is available as a cassette and also in EPROM form as part of its 16K RAM pack system. With the latter you can switch from 14K RAM plus 2K monitor to the full 16K RAM. Apart from the usual functions, it has a helpful hex calculator and a facility to create REM statements of any length. It also has a comprehensive manual at £7.50 in cassette form, and the RAM-pack system costs £48.

'In some ways the assembler program is similar to the Basic ROM in the ZX-81.'

Bug-Byte, 98-100 The Albany, Old Hall Street, Liverpool L3 9EP.

ACS, 7 Lidgett Crescent, Roundhay, Leeds LS8 1HN.

Campbell Systems, 15 Rous Road, Buckhurst Hill, Essex IG9 6BL.

Aylesbury ZX Computer Club, 12 Long Plough, Aston Clinton, Aylesbury, Bucks.

MicroGen, 24 Agar Crescent, Bracknell, Berkshire.

Picturesque, 6 Corkscrew Hill, West Wickham, Kent BR4 9BB.

Taurus, 47 High Street, Baldock, Herts SG7 6BG.

THE BIG 3 FROM WORK FORCE

WINGED AVENGER

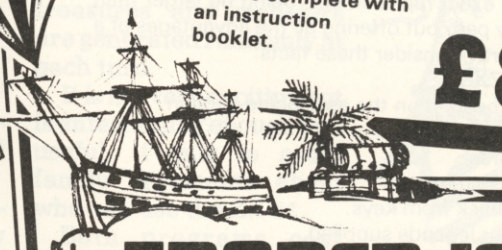
16K RAM 7 LEVELS OF PLAY 3 WAVES
LASER SHIELD + RAPID FIRING + HIGH
SCORE ARCADE ACTION GAME IN MACHINE
CODE SO FAST IT MAKES YOUR EYES SORE!
(GOOD ZX81 PROGRAMS WANTED)

£5.95

ZX81 MONOPOLY

ZX81 MONOPOLY allows up to six players to compete with the machine doing all the boring bits. Sorry NO cheating allowed YOU can't argue with a computer. ZX81 MONOPOLY allows the game to be saved with a WINNER SO FAR report to END all arguments! Uses virtually all of 16k and comes complete with an instruction booklet.

£8.00



TRADER JACK

Best described as a TRADING ADVENTURE game it's a PAIN. Written for MASOCHISTS the game starts INNOCENTLY with £40,000 in your hand. THEN you're on YOUR OWN! You choose CREW, SHIP, STORES and CARGO. You even choose where to go and either make a FORTUNE or FAIL to SURVIVE. GO CAREFUL you have 200 Bytes left from 16k.

£7

WORK FORCE
140 WILSDEN AVE., LUTON, BEDS.
Tel: Luton 454456

Dept SU

The ultimate SINCLAIR ZX 81 (16K) DATABASE FILING SYSTEM

by DALE HUBBARD

Fed up with boring games — make your ZX81 work for you!
The one you've been waiting for!!

Cassette based
Clear "menu" operation
Facilities include sort, search, list, delete, change, total numeric field, save and load file, line print, etc.
Complete with demonstration file and full instruction/application leaflet.
Requires 16K Ram pack.
Applications: Recipe file
Stamp/coin collections
Inventory Control
Employee Data
Record Collections
Magazine article catalogue
May be used for any application where fast access is required to stored information

Access accepted
Send cheque or P.O. or credit card number to:
GEMINI MARKETING LTD.
Quay House, Quay Road, Newton Abbot, Devon TQ12 2BU
OR telephone us with your credit card order
on Newton Abbot (0626) 62869

ONLY
£5.95 FULLY INCLUSIVE!

DESPATCH BY RETURN

Special Officer FREE
Computerised decision-making program with every order received before July 15th 1982!

KEMPSTON MICRO ELECTRONICS

PRESENTING THE NEW . . .

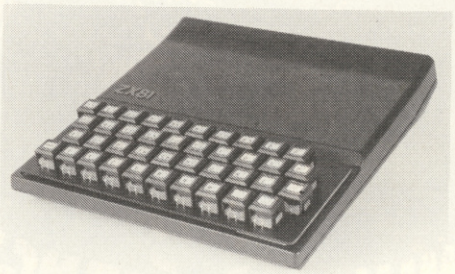
ZX KLIK - KEYBOARD

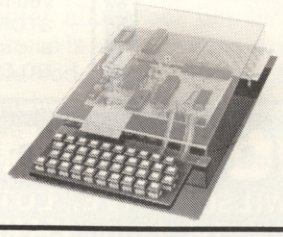
IF YOU ARE like many ZX81 users and are fed up with the dead 'touch sensitive' key pad then consider the advantages of the new KEMPSTON KLIK-KEYBOARD. This is a genuine push button keyboard which has been designed as an exact replacement, being no larger than the existing key pad, but offering all the advantages of a full size keyboard. Consider these facts:

- Fits on to the ZX81.
- No soldering needed on the assembled version (just plug in)
- No trailing wires.
- No special case required.
- Positive feedback from keys.
- Full two colour legends supplied.
- Full back-up service offered, including fitting.

This is a genuine 40-key, push button keyboard which fits into the recess formed after peeling off the existing touch sensitive keypad.

The kit comes with a precision drilled P.C.B. finished in matt black, 40 keys, 2 colour legends, connecting tails, adhesive pads and a full set of instructions.





Also available from our range of products is a Parallel User I/O post £16.50 built & tested. Gives 16 I/O lines to drive light relays, motors etc. Many already sold to education. Keyboard bleeper £8.95 built, repeat key kit £2.95.

Your Name and Address _____

Date

Quantity	Description	Unit price	Amount
	ZX81 Keyboard Kit	£22 50	
	ZX81 Keyboard Assembled	£26 00	
		Sub total	
		Carriage	70
		Total due	

Please allow 14 days for delivery.

Kempston Micro Electronics

60 Adamson Court, Hillgrounds Road, Kempston, Beds. MK42 8QZ

Proprietor A. Pandaal, B.Sc., P.G. Cert. Ed.

ARTIC

MOVING AHEAD WITH ZX SOFTWARE

ZX CHESS & ADVENTURES

PROGRAMS FOR THE ZX81/80 INCLUDING —

NEW ZX-FORTH	Full implementation of FORTH for the ZX — 10 — 26 time faster than BASIC. 'Simplicity of BASIC with speed & machine code.'
NEW 16K RAM PACKS	BYGBYTE RAM PACKS, no wobble problems. 1 year guarantee on each RAM PACK. The best you can buy. Immediate delivery.
NEW 1K ZX-CHESS!!	We didn't think it was possible, but the game plays against you, two opening moves, only 1K of memory needed.
ZX CHESS I reduced to £6.50	Very popular machine code program, with six levels of play and an analysis option. Unbeaten except by:
ZX CHESS II now only £9.95	A new improved version with a faster response time, seven levels of play, and in addition a recommended move option.
ADVENTURES	Exciting machine code games with instant response, choose from the range below. You find yourself stranded on an alien planet.
ADVENTURE 'A' £6.00	Can you reach your ship and escape?
ADVENTURE 'B' £7.00	In a jungle clearing you come across an Inca temple. You must break in, collect treasure and escape alive. Beware. Includes a cassette save routine.
ADVENTURE 'C' £8.00	You are unfortunate enough to be drawn to an alien cruiser. Can you reach the control room and free yourself or will they get you first? Includes a cassette save routine.
GALAXIANS £3.95	All the features of the acarde game in a fast machine code program. Swooping attackers, explosions and personalised scoring.
ZX BUG £7.00	A 30 in 1 machine code tool and disassembler, allows access to all registers and to search through, and modify memory; with cassette routines.

and many more. For a catalogue giving full details, please send a S.A.E to

Artic Computing
Dept. EE
396 James Reckitt Avenue
Hull HU8 0JA.

ZX81 Workstation...

. . . is a stylish and ergonomic plinth for the ZX81. It raises and tilts the TV to avoid eyestrain, holds the 16K RAM in place and hides the wiring and power supply. This very professional unit costs £15, a built-in power switch is £3, plus postage at £1.50, inc. VAT.

Peter Furlong Products, 125 Catford Hill, London SE6 4PR.
Callers by appointment, please. Tel 01690 7799. Visa, Access.

Accounting for small business

TWO sophisticated accounting programs have been put on to the market by Hestacrest with the intention of improving the efficiency of routine accounting at low cost.

The programs are written for preparing accounts from incomplete records of a sole trader and a limited company. They are written for use mainly by accountants but they can also be useful to the small trader with a little knowledge of accounting.

Figures can be entered into the accounts in the usual forms, including cash payments and receipts and bank payments and receipts. Using a system of coding, the accounts are then built-up from those, printing-out all the records of interest to the company.

The programs are available from Hestacrest, PO Box 19, Leighton Buzzard, Bedfordshire. LU7 0DG, costing £17.50 each or £25 for the two.

Improved Othello

MINE of Information has produced what it claims to be an improved version of its game **Othello**. The improvements include more features for a lower total price of £6.90, better loading and easier use.

All input is said to be crashproof and loading problems have been overcome by a hardware modification to generate a strong, clean, original signal and tape duplication using a signal enhancement process.

The new features include the ability to replay moves at any stage, both forward and backward.

The new program, known as version 3.5, was shown at the ZX Microfair at the beginning of April and lost only one contest out of 30 when playing at half power.

Othello is available from Mine of Information, 1 Francis Avenue, St Albans, Hertfordshire.

Adventures from Algor

ALGOR has produced two adventure games which are different from anything else on the market. **Shelob's Lair** is a 13K Basic and machine code game which gives a 3D image of your location and shows all the exits in perspective.

There are plenty of monsters and treasures, represented in words rather than graphics, scattered around the 180 rooms.

The room displays are generated using code and are impressively fast. The layout and the contents of the rooms change only if you reach a different level, in which case a set of tougher monsters and more valuable treasures is generated.

The other program is **Mines and Monsters**, which allows up to four players to play at the same time. It is a 13K Basic game in which all the locations, treasures and monsters are generated randomly at each turn.

It is not very exciting but is entertaining enough and useful, if only to avoid family arguments about who can use the ZX-81.

Both programs cost £3.50, Shelob's Lair being packaged with an economy simulation game and Mines and Monsters having a multi-player stock market game. Algor is at Dovercourt, St. James Road, Northampton.

Zuckman for the ZX-81

WHAT IS said to be the first ZX-81 version of the popular arcade game **Puckman** has been produced by DJL Software. Called **Zuckman**, it runs on the ZX-81 with the 16K RAM pack.

It is very user-friendly, giving complete instructions for playing. Written in machine code, it is a fast and interesting game and requires a quick appreciation of how to move the figure.

Zuckman is available from DJL Software, 9 Tweed Close, Swindon, Wiltshire.

Parlez-vous le Basic?

A CASSETTE to help children with GCE O level French examinations has been produced by Rose Cassettes, which specialises in educational software for the ZX-81. For use with the 16K RAM pack, it covers grammar and vocabulary. On the first side, there are three sections dealing with verbs, pronouns and adjectives, with lessons followed by tests. The second side deals with vocabulary, with 345 nouns, more than 190 verbs and about 290 common expressions.

The cassette is available from Rose Cassettes, 148 Widney Lane, Solihull, West Midlands at a cost of £4.50 including postage.

Fighting the Prince aliens

FOR THE intrepid fighter against all things alien, **Astro-Invaders** is the lead game in a pack available from John Prince Software costing £3.65.

According to the company there is no superior version of the game on the market at such a competitive price. In machine code, it runs automatically on loading and involves 54 manoeuvring aliens which are knocked out by photon-firing torpedoes. As the game proceeds the attack rate increases.

The other games in the pack are **Grand-Prix, Penalty, Golf** and **Swat.**

John Prince Software is at 29 Brook Avenue, Levenshulme, Manchester.

MICRO GEN QUALITY PRODUCTS

ZX81 A/D CONVERTER BOARD

This 4 channel analogue to digital converter, originally developed for joystick control, can be used for such applications as measurement of voltage, temperature, light intensity etc.
The board fits in between the RAM pack and the ZX81. (No skill is required to make this connection, and it actually improves the stability of the RAM pack).

Price now only £18.50

JOYSTICKS for the ZX81 only £9.60 each

* The most exciting add-on ever for the ZX81, free yourself of that dead, unresponsive keyboard.
* 1 or 2 joysticks may be connected via our A/D board.
* Turns your ZX81 into a true programmable games machine.
* Extends the capability of the ZX81, imagine the tremendous variety of games and applications that now become possible.
* Details supplied on how to use the joysticks in your own programmes.

Please note that you cannot connect conventional analogue joysticks directly to the digital input ports found on most I/O boards, an A/D converter such as ours is required.

A free copy of ZX AMAZE plus any one of the games listed below when ordering a joystick and an A/D board.

PROGRAMS AVAILABLE

ZX SPACE INVADERS. You've tried the rest, now try the BEST. This program has many features including an ever increasing rate of play (they'll get you in the end).

only £3.95

ZX BREAKOUT. Quite simply the best breakout on the market. Features seven bat angles, (you won't find this one easy).

only £3.95

ZX BOMBER. A very addictive arcade game.
Bomb and shoot your way out of trouble, otherwise you are doomed to crash. Generates a different pattern, for a different game each time you play. On the reverse of the cassette is ZX REFLEX, find out how fast you really are.

now only £3.95

ZX CHESS. The original and still the best. * Graphic display of chessboard * 6 levels of play. * Displays record of your moves and the computers. * Board can be set up to any position. * Has ability to change sides or level in mid-game. * PLUS * CHESS CLOCK on reverse side, records time taken by each player. * Resetable function.
* Single key entry.

now only £6.50

DISASSEMBLER & MONITOR. Allows you to enter and run your own machine code. Relocates to top of memory to allow you to load other programs and find out how they work. Block move. Byte search. Load display and alter all CPU registers. Window on memory facility, uses standard mnemonics, an absolute necessity if learning machine code.

only £3.95

ZX SCRAMBLE. This is the fastest arcade type game we know 32 zones, thrust and altitude controls, smart bomb and firing controls.

only £3.95

SORCERER'S CASTLE. New from Micro Gen, Magical Adventure Game with graphical position. Allowing a host of options.

£3.95

All our games can be used with joysticks or keyboard, (except chess and Sorcerer's Castle keyboard only). Supplied on cassette with library case.

It you write a program which is exceptional, please submit it to us. We will offer a royalty if it is suitable.

Cheques + POs: Payable to MICROGEN, 24 Agar Cres. Bracknell, Berks.
Please add 40p P&P to all orders

ZX81 THE ULTIMATE CONVERSION?

THIS SUBERB LOOKING DESK CONSOLE HOUSES A ZX81

If you would like your ZX81 to look like this, then send it to us and we will return it to you built into this cabinet including a 9" monitor connected directly to the video output of the ZX81, and a full mechanical key lock. All for **£195.**

Alternately we can supply the cabinet only for £38 + £5 p&p.

RIVERSIDE HOUSE, BRADLEY LANE, NEWTON ABBOT. DEVON.
TELEPHONE NEWTON ABBOT (0626) 68622.

MICROWARE

NEW SHOP IN

LEICESTER

FOR

SINCLAIR

COMPUTERS

Keyboards • Ram Packs • 1/0 Parts • Monitors • Graphic Boards etc.
Games, Serious, Home, Business Software, Books & Magazines.

MICROWARE

131 MELTON ROAD, LEICESTER
Tel: 0533 681812

Holiday Closing
Our shop will only be open on Mondays, Fridays and Saturdays between 28th June and 16th July

Shop Open 9.30-5.30
Closed Thurs.
S.A.E. Brings Catalogue

'SUPER SUMMER SALE NEW OR GENUINE REDUCTIONS'

MICROWARE

MICROWARE

MICROWARE

Kempston keyboard

KEMPSTON Electronics has produced a micro-miniature version of the ZX-81 keyboard with real keys. It is the same size as the original Sinclair keyboard and so can be placed on the top of it. It is only half-an-inch high and its black keys blend well with the ZX-81.

The keyboard can be fitted by opening the case and removing the original leads to the sockets on the PCB and replacing it with the leads from the Kempston unit.

The company also produces an Educase which exposes the printed circuit board to the naked eye, for students and teachers to see through the clear plastic cover.

It is ideal for demonstrating the working of a computer; the back can contain a parallel port complete with a demonstration program to run a Centronics printer. Unfortunately there are no Sinclair graphics. The keyboard costs £22.50, Educase £19.95, and the parallel port £18.95.

Kempston Electronics is at 60 Adamson Court, Hillgrounds Road, Kempston, Bedford MK42 8QZ.

Speech pack from DCP

DCP has produced a speech pack which can be fitted directly to the back of a ZX-81 and which will not interfere with any planned expansion. Using a maximum of two memory-mapped ports at 49148 and 49149, the various ROMs containing the words can be POKEd via Basic to the loudspeaker included inside the unit.

The speech can be heard through the loudspeaker or, if required, can be amplified via the jack socket provided — 8 ohms. The amount of words it can say depends on the number of ROMs fitted inside the box. A maximum of four can be fitted and the basic model is supplied with the first one.

Kempston's new keyboard.

Most of the words are measurements of one kind or another, but PAUSE statements between words can be altered so that you can create your own from the words supplied. You are limited to the beginning of words, however, as the speech is stored only in complete words, not sounds.

The speech pack costs £49.95, complete with ROM 1, and extra ROMs are available at £14.95 each, including VAT and postage. DCP Microdevelopments, 2 Station Close, Lingwood, Norwich NR13 4AX.

Thurnell motherboard

THURNELL ELECTRONICS has now extended its range of equipment for the ZX-81 to include a motherboard, LED indicator board, transistor driver board, relay board to control up to 1.5A AC or 24V DC at 3A. All are in cases but the original I/O port is still available in kit form and without a case.

A motherboard can connect up to four devices to the port at once. The port is based on a Z-80A PIO and so is completely compatible with the ZX-81. It costs £14.95 as a kit without a case and £17.95 fully-assembled with case. The eight-transistor driver box costs £9.95, and motherboard £15.95. For orders of less than £20, add 50 pence for post.

Thurnell Electronics is at 95 Liverpool Road, Cadishead, Manchester M30 5BG. Tel: 061-775 4461.

Printer interface

CAPITAL COMPUTERS has produced the first motherboard with bank-switching incorporated on-board. The expansion motherboard also sorts out the reflections of the ROM and RAM so that the full 56K left can be used. It includes a +5V regulator for a separate power supply, an optional metal case, and a range of plug-in boards.

The boards contain 16K of extra memory, full RS232 serial interface to drive printers, Centronics parallel interface for printers complete with handshaking, and a 2716 ROM containing the driver routines.

All the expansion motherboard sockets are buffered so that the pulling-out of cards should not crash the system. The expansion motherboard costs £40.20, serial/parallel interface board £45.95, 16K RAM £33.93, and the metal chassis £19.50.

All are obtainable from Capital Computers Ltd, 1 Branch Road, Park Street, St. Albans AL1 4RJ.

Memory board from Fuller

FULLER Micro Systems has added a new board to its range of equipment whch can fit inside its keyboard case. It starts as an ordinary 16K board supplied with the industrial standard 4116 chips but if you decide later that you need more memory you can upgrade the board to a full 64K by changing the RAM chips

continued on page 48

continued from page 47

and a few straps on the same board.

The 16K PCB will fit into any motherboard which provides sockets for boards to plug into and costs £39.95. To upgrade it to full 64K will cost another £45 for instructions and the 64K chips to fit to the board.

The complete Fuller Micro Systems range can be seen and purchased from The ZX Computing Centre, Sweeting Street, Liverpool 2.

TV Services bleeper

TV SERVICES of Cambridge has a neat little keyboard bleeper called the KAT keyboard audio tone. The device can be fitted inside the case in the space beneath the keyboard, or in any other place for that matter, as it is an extremely flat PCB and piezo-electric loudspeaker.

There are only five soldering connections to make to the ZX-81 PCB, as the rest is ready-assembled. If that makes you nervous, the company will fit it to your ZX-81.

The bleeper gives two tones, one when a key is pressed and one when the computer answers; it also signals the start and finish of a LOADing or SAVEing program. It may also be programmed to bleep in a program — for simulating an explosion — by using a PAUSE greater than 5.

The KAT costs £8.95 if you fit it yourself and £10.95 if you send your ZX-81 for it to be fitted.

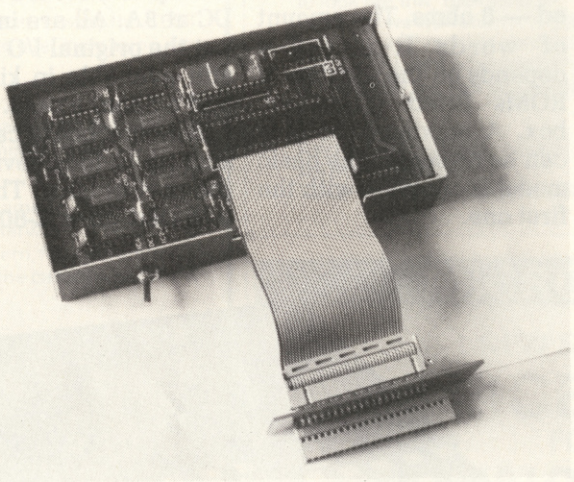
TV Services of Cambridge Ltd, Chesterton Mill, Frenches Road, Cambridge CB4 3NP.

2K monitor EPROM

TAURUS Computer Design has a 16K RAM pack which also contains a 2K monitor EPROM for writing machine code programs on the ZX-81. It replaces the top 2K of RAM when the switch is thrown on the front of the RAM pack and you can enter the machine code monitor by a simple USR command.

The monitor provides facilities such as hex arithmetic, break points, copying data from one place to another, decimal to hex conversion, fill, memory display, port read and write, plus many more. The monitor will write a suitable-length REM statement at the beginning of a program, so that your machine code routine can be stored there and will even re-set the Basic variables so that a RETURN from the monitor will not crash the program. All is contained in a metal box 6½ × 2½ × 1½in. which attaches to the ZX-81 edge connector via a ribbon cable to prevent crashing the program, due to the movement of the ZX-81.

The 16K RAM pack costs £59.95 with the monitor and £49.95 without, from Taurus Computer Design, 47 High Street, Baldock Herts SG7 6BG. Tel: 0462-893900.



The 16K RAM pack from Taurus Computer Design.

BASICare conversion

BASICare has produced the Organic micro, a system which makes incompatability between systems out-of-date. The idea is that every computer should use the same connections to the RAM packs and ports but, because each time a computer manufacturer produces a new machine it changes the way it connects, that has not been possible previously.

Now BASICare will provide a personality module to convert the ZX-81, BBC computer or Apple in one standard connection, so that any computer can grow from 16K RAM to more than 1MB of RAM.

The packs which use the bus will then be available to be used by any machine to provide printers, ports, Toolkit programs, CMOS and dynamic modules.

The silver packs are connected mechanically as well as electrically, to each other, so there should be no chance of a faulty connection. The basic Persona module costs £30.42 inc. VAT and postage.

BASICare Microsystem Ltd, 5 Dryden Court, London SE11 4NH. Tel: 01-735 6408.

Metrimpex disc drive

METRIMPEX of Hungary is introducing a revolutionary new disc drive system to this country and at least one manufacturer, Macronics, has opted for it. The disc drive is very similar to an eight-track tape recorder, as the disc is stored in a hard plastic box which is opened only when the disc is inserted into the drive.

It can fit in the palm of your hand and can provide up to 200KB of memory on one disc. The power supply is + 12V and + 5V and it weighs only 0.47 kilogrammes.

The drive provides a standard interface so that it can be used with disc controllers already available. The price in quantity is £50 and details can be obtained from BATS-NCI Ltd, 375b Regents Park Road, London N3 1DG. Tel: 01-349 4511.

ZX REGISTER

brings together the Sinclair ZX world within one cover

DIRECTORY OF 350 SUPPLIERS

Schedules of **SOFTWARE** programs — Games, Educational, Business, Computer Enhancement and Domestic sub-divided into a further 30 categories.

Extensive list of **HARDWARE** items for sale

Index of **ZX PUBLICATIONS**

References to reviews of ZX ware

USER CLUBS — when and where to meet

Much other useful information including details of other services and programs, notes for new users, advertisements.

Price £2.95 from

YOUNGS ZX REGISTER

2 Woodland Way, Gosfield, Halstead Essex CO9 1TH

The register is being continuously revised and re-issued
If you want your new product to be in the Register contact us

We can also arrange for you to be on PRESTEL

Bridge Software

RAM Pack with £1 OFF BS software

FOR THE ZX81

Both RAM packs use same neat ABS plastic case (only 27 × 47 × 76 mm).
Supplied with foam strip connector to improve mechanical stability.
Fully guaranteed. Fully compatible with ZX Printer.

16k RAM £26-95 64k RAM £59-95

All-inclusive prices. When ordering, deduct £1 from price of any item of software.

NOTE 56k of the 64k RAM is user-addressable. memory is in 4 areas:
0.8k Sinclair BASIC ROM (real only)
8-16k Machine code area unaffected by CLEAR, NEW, LOAD, SAVE
16-32k BASIC program area
32-64k BASIC variables & arrays and/or machine code

BS

NEW! **Quality Software** FOR THE ZX81

SUPER INVADERS cassette (16k RAM needed) £4.95
An enhanced version of our top-scoring GALAXY INVADERS PROGRAM. Now incorporates improved invader shages, animated on-screen instructions and league tables of the six highest scores obtained at each of 3 difficulty levels.

GALAXY INVADERS cassette and instructions (minimum 4k RAM)
Still available at only £3.00
Machine code for 10 difficulty levels, 20 invaders in 4 rows of 5.

LYNCHMOB (Family Fun No.2) cassette and instructions (16k RAM) £4.95
A competitive game for 2 to 6 people. The ZX81 picks turns, keeps the score and lynches the losers in animated graphics! Great fun. Educational too.

FAMILY FUN No. 1 (1k RAM only £3.95
Five family fun games. Cassette and Manual with intructions, listings, program notes.

MULTIGRAPHICS 2.3 (16k RAM needed) £6.90
A friendly menu-driven package of procedures giving you full control of the ZX81 graphics. Supplied with 20 page illustrated manual.

GRAPHICS STARTER PACK (Four 1k Graphics programs) £4.50
Cassette and 12 page illustrated booklet with listings, detailed technical notes on the programs explaining the use of PLOT, UNPLOT, PRINT SPACE AT, INKEY$, GOSUB, PEEK, The ZX81 character tables etc.

STATISTICS PACKAGE (Foru 1k Statistics programs) £4.00
Cassette and 8 page booklet containing listings, instructions for use, sample data and results. Computer means, SDs, variance, regression, t and f tests etc.

Send s.a.e. for further details. Prices all-inclusive in British Isles
European customers please add 30p per software item; worldwide 70p.
Overseas customers write for details of hardware mailing charger.

BRIDGE SOFTWARE (SU)
36 FERNWOOD, MARPLE BRIDGE, STOCKPORT, CHES. SK6 5BE
Available by mail order or from leading computer stores
Trade enquiries welcomed.

CARNELL SOFTWARE

ZX81 ADVENTURE SPECIALISTS

C2: VOLCANIC DUNGEON/HANGMAN £4.50

A) VOLCANIC DUNGEON: Rescue if you can the Elfin Princess. Mythical monsters, pits, fiery caverns, diminishing strength and water make your quest anything but easy.
FULL 16K PROGRAM * * SAVE GAME ROUTINE
* * SINGLE KEY ENTRY * *
"Volcanic Dungeon is terrific value and I would recommend it to anyone" Mrs Thomas Cornwall

B) HANGMAN: Delux version of the classic game. Play against an opponent or the computer's 400 word vocabulary. Good graphics.

C3: ALIEN INTRUDER/HIEROGLYPHICS £5.00

A) ALIEN INTRUDER: You awaken to find you are the only survivor on the Explorer Class 3 Starship. Can you escape before you also fall victim to the Alien monstrosity that devoured the crew? There are many ways to end this adventure but only one way to survive!
FULL 16K PROGRAM * * INTERACTIVE GRAPHICS
* * SAVE GAME ROUTINE * *

B) HEIROGLYPHICS: Decode the ancient 39 symbol alphabet in time to save the famous explorer, "Wullie Makeit" from a sandy grave.
FULL 16K PROGRAM * *ANIMATED GRAPHIC DISPLAY
* * RANDOM CODE * *

C4: WUMPUS ADVENTURE/MOVIE MOGUL £5.00

A) WUMPUS ADVENTURE FOR 1 TO 4 PLAYERS: Seek the famous creature in the most dangerous Wumpus hunt ever. All the usual features are there:
SUPERBATS * PITS * TREMORS * SWAMPS * MAGIC ARROWS
PLUS Exciting new features EVIL GOBLINS that will try to sacrifice you to the Wumpus.
* GIANT SERPENTS * WUMPUS MUCK * MAGIC SPRINGS *
FULL 16K PROGRAM * * RANDOM & PRESET CAVE PATTERNS
* * YOU CONTROL THE LEVEL OF DIFFICULTY * * GREAT FUN FOR YOU AND YOUR FRIENDS * *

B) MOVIE MOGUL: Guide your film through the often hilarious traumas of production. Use your budget wisely and you may make a fortune. Success depends on many factors and not just luck.
FULL 16K PROGRAM * * *

ORDERS: Plus 50p P&P or large S.A.E. for list to:-

CARNELL SOFTWARE
4 STAUNTON ROAD, SLOUGH, BERKS. SL2 1NT
The above are also available from BUFFER MICROSHOP, STREATHAM, LONDON

EDUCATIONAL COMPUTING on the ZX81

Suit children ages 5-11

No comparable collection offers so much for so little

THE LITTLE PROGRAMMES WHICH ARE BIG EDUCATORS

Here at last. A set of programmes to turn your Sinclair ZX81 into a powerful educational tool. And you don't even need to know programming. There are clear instructions and plenty of tips & advice. Designed to go beyond drill & practice the promote learning through interaction & discovery.

All programmes fit 1K

Creative use of graphics

Many innovative ideas

Fully documented

Includes many games

Educare's **50** 1K PROGRAMMES for PRIMARY EDUCATION

Includes:-

TORTOISE
A simplified version of the famous Turtle programme

CODED MISSILE
Combines the fun of arcade games with learning

£4.95 only incl. p & p

Graph-plotter ● Histogram ● Simon-spell ● Sketchboard ● Times-table ● Sets
Series-quiz ● XY-coordinates ● Count ● Equations ● Areas ● Guess-a-Volume
Angles ● Upstairs-Downstairs ● Music-notes ● See-saw ● Wipe-out ● Spell
Temperature ● Clock ● Money ● Snake
Mastermind ● Number-shoot ● + 26 more

EDUCARE

To: EDUCARE, 139a Sloane St. London SWIX 9AY

Please send me.....copies Educare's 50.
I enclose cheque/postal order for £.....
Name.....
Address.....

Let your child benefit early. Send now

ZX81 SOFTWARE

ALTERNATIVE PROGRAMS (1-16K)
FOR THE MORE DISCERNING ENTHUSIAST!

CASSETTE 1

MATHS ONE (16K)
ATTENTION ALL PARENTS! Prompted by an article in Practical Computing (Jan 81) on inferior maths software, we decided to produce a program that would give your child more than the boring reply: "sorry you are wrong, try again!" MATHSONE will give your child sums in the normal way and actually show your child where he/she has gone wrong. Note the whole sum is printed on the screen just as the child would do with pen and paper!

MATHSKATE (16K)
See whose rollerskater can reach the post first but the sums become more and more difficult!

Mathsone + Mathskate £3.95

CASSETTE 2

LANGUAGE TRANSLATOR
Having difficulty with foreign text? Then this is the program for you! Fast word for word translation, from 600 words in seconds. Words can easily be changed and SAVED on tape. Please state language choice.

WORD TEST
For the very junior members of the family. WORD TEST will give children partially completed words. Second trys are allowed and the score out of ten with correct answers are shown.

Language Translator + word Test £3.95

CASSETTE 3

BANK ACCOUNT (16K)
Why wait for a statement when you can have your own personal banking system! Accepts standing orders in the usual way and will tell you when your balance is below the free banking limit, then actually charge you for it! Just like the bank! Statements can be backdated and up to 150 transactions can be stored!

HOME BILLS READY RECKONER
Want to know if your electricity/telephone/net pay are correct?

Bank Account + Ready Reckoner £3.95

PLEASE NOTE: Our software is of the very highest quality and stands to compare with the very best from the Sinclair stable and even if we say so ourselves exceeds that standard.
No knowledge of computing required, just load and run!

YOUR ORDER IS RECEIVED AT 8.30 AND IS DESPATCHED BY 12.30 THE SAME DAY. 14 DAY MONEY BACK GUARANTEE IF NOT SATISFIED + 6 MONTH REPLACEMENT GUARANTEE.

Make cheques, P.O. etc payable to:

FUTURESOFT

38 PENSHURST ESTATE, PRINCE OF WALES ROAD, LONDON, N.W.5.

FOOTBALL MANAGER

Addictive Games

for
ZX81
ZX80
TRS80
VIDEO GENIE

JUST LOOK AT THESE FEATURES

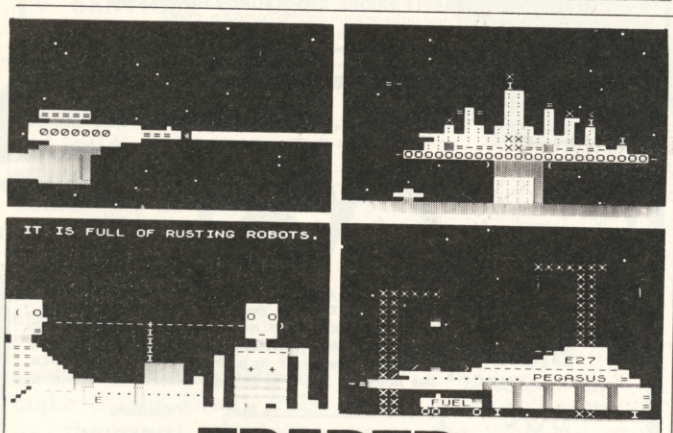
★ AS MANY SEASONS AS YOU LIKE ★ 4 DIVISIONS ★
★ PROMOTION & RELEGATION ★
★ FULL LEAGUE TABLES ★
★ TRANSFER MARKET ★
★ INJURIES ★
★ 7 LEVELS OF PLAY ★
★ SAVE GAME FACILITY ★
★ MANAGERIAL RATING ★
★ PICK YOUR TEAM FOR EACH MATCH ★ F.A. CUP ★

This is NOT a mere simulation. This is an exciting and highly enjoyable game in which you play the part of a Football Manager coping with the problems and decisions involved in running your club. There are so many features it is impossible to list them here but included are form (top teams NORMALLY win), giant-killings, wage bills to pay, and you can even be sacked! It is a game requiring a great deal of skill, and people play it for literally hours on end (we have proof!).
WE GUARANTEE that this is one of the best computer games you've ever played!
BUT BEWARE, this game is extremely addictive!

FOOTBALL MANAGER - *IS SUPPLIED WITH INSTRUCTIONS*
- *OCCUPIES THE ENTIRE 16K RAM*

HARDWARE REQUIRED	
ZX81/ ZX80	*TRS80/ Video Genie*
8K ROM 16K RAM	*LEVEL II 16K RAM*

To Order send Cheque/P.O. £7.95 made payable to: ADDICTIVE GAMES at: Dept S.U. P.O. BOX 278 CONNIBURROW MILTON KEYNES MK14 7NE PLEASE STATE COMPUTER



TRADER

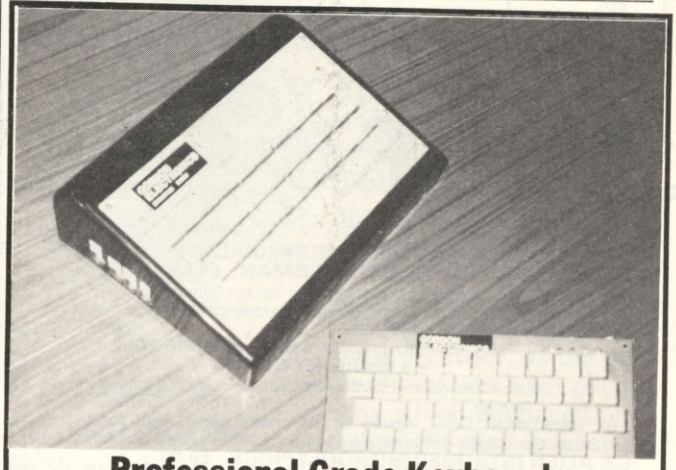
It is hard enough to look at an amorphous hydrosilicon blob from Psi, never mind swing a deal with one. But when they ask to pick your brains, do you really know what they have in mind . . . ?

'Trader' is a new concept in ZX81 games. It is a graphic adventure so big that it fills your 16K Ram three times. You are an intergalactic trader and the life is tough, the bargaining hard. You can make a fortune or end up spaced out in a Deltan hellhole.

"Trader'. 48K of adventure that will run in your 16K Ram. It costs £10.50 inclusive. Send SAE for more details of Pixel games.

PIXEL

Pixel Productions 39 Ripley Gdns. London SW14 8HF.



Professional Grade Keyboard and Case at Unbeatable prices

*Our case takes the ZX-81 printed board
*Keyboard supplied fitted to case
*Your Ram Pack plugs into rear of case
*Assembled Keyboard and case price £36.00
*Keyboard complete with ribbon cable & connectors
*No soldering required
*Large keys are used with changeable keymarkers
*Keyboard ready assembled price £24.00

Sinclair makes the best home computers and we make the best keyboards
**Full money back guarantee if you are not fully satisfied*
Prices include VAT

*16K Ram Pack — fully tested, ready built and in a case. Uses existing power supply. *STAR BUY - £28.00 *

Mail Order Address:
GORDON ELECTRONICS
76 Mountbatten Road,
Braintree, Essex CM7 6TP. Telephone (0376) 26048.

Please add £1.50 P&P.
Make cheques payable to GORDON ELECTRONICS

THE EXPLORER'S GUIDE To The ZX81

The Book for the ZX81 Enthusiast.

By Mike Lord, 120 pages.

Programs for 1K RAM, and programs for 16K RAM. Games, Business and Engineering Applications. RAM & I/O Circuits. Useful ROM Routines. Hints and Tips.

£4.95

What Can I Do with 1K?

By Roger Valentine. A fresh and original book containing 40 programs and routines for the unexpanded ZX81.

£4.95

The ZX80 Magic Book

With 8K ROM/ZX81 Supplement

£4.75

Mastering Machine Code on your ZX81

By Toni Baker. 180 pages of immense value to beginner and expert alike.

£7.50

We welcome Access | VISA

ALL PRICES INCLUDE U.K. P & P AND 15% VAT WHERE APPLICABLE. OVERSEAS CUSTOMERS ADD £1.50 CARRIAGE PER ORDER. PAYMENT WITH ORDER PLEASE.

TIMEDATA LTD Dept H. 57 Swallowdale, Basildon, Essex SS16 5JG Tel: (0268) 411125 (MON-FRI)

TIMEDATA

SOUND with ZX-81!

MAKE AMAZING SOUND EFFECTS WITH YOUR ZX-81

£25.95 incl p&p & V.A.T. **THE ZON X-81**

* The ZON X-81 SOUND UNIT is completely self-contained and especially designed for use with the ZX-81. It just plugs in – no dismantling or soldering.
* No power pack, batteries, leads or other extras.
* Manual Volume Control on panel – ample volume from built-in loudspeaker.
* Standard ZX-81 – 16K Rampack or printer can be plugged into ZON X-81 Sound Unit without affecting normal ZX-81 operation.
* Huge range of possible sounds for games or: Music, Helicopters, Sci-Fi, Space Invaders, Explosions, Gun-shots, Drums, Planes, Lasers, Organs, Bells, Tunes, Chords etc., or whatever you devise!
* Uses 3-channel sound chip giving programme control of pitch, volume of tones and noise, all with envelope control.
* Easily added to existing games or programmes using a few simple "BASIC" lines.

FULL instructions with many examples of how to obtain effects and the programmes, supplied. Fully Guaranteed.

BI-PAK Dept SU7 P.O. Box 6, 63A, High Street, Ware, Herts. Access & VISA accepted Ring 0920 3182 for immediate despatch.

ENHANCE YOUR SINCLAIR ZX81!

Video Inverter adds professional touch

Displays sharp, white characters on solid black background TV screen.

A toggle switch lets your choose between NORMAL and REVERSE.

NEW ORDER NOW!

ONLY £5 (VAT, P&P incl.)

A small printed circuit board fits on top of the logic chip inside your ZX81.

Comprehensive, easy to follow, step by step instructions make the modification a simple task.

For convenience print your name and address on back of your cheque or postal order and send to:

D. FRITSCH,
6 Stanton Road,
Thelwall,
Warrington
WA4 2HS

ZX81 PERSONAL BANKING SYSTEM with load/save datafiles at double speed

Load the program in the normal way — enter, amend or delete your transactions (ZX81 will automatically scan standing order file and post any items due) — save the file of data onto cassette in 45 seconds — load a different datafile into the same program, also in 45 seconds — enter items, etc. — save datafile only onto cassette (45 seconds) — repeat operation for any number of accounts.

Absolutely no need to save *program*, as all information is held in datafiles. Very easy to use — unlike other bank accounts. Requires a minimum of 16K RAM can use much more (no modification required). On Demonstration at the next ZX Micro Fair.

The Personal Banking System also includes the following features:

Full page detailed Bank Account, dual display (or printout).
Automatic generation of standing orders on due dates.
Validation of all entries.
Correct any item previously entered. (Single/Multiple field correction.)
Enter an item (previously omitted) in the correct date order of the account.
Single key operation. Utilises a M/C keyboard scan.
Search for any item or items by cheque number, description or amount — display (and printout if required) with totals.
Continuous display of statement extract, continually updated during input of entry.
File of standing order details can be displayed, printed, added to,. cancelled and amended.
Detailed User Manual.
After sales maintenance.

Send £9.95 ($20) incl. for cassette and users manual to J.P. Gibbons A.I.B., 14 Avalon Road, Orpington, Kent BR6 9AX, England. (Send large S.A.E. for details.)

There are only two suppliers of supported ZX81 software, this is one of them. Be sure to include your name and address.

Coming soon: Bank Reconciliation Module — a separate program on cassette that utilises data supplied by the main program (S.A.E. for full details).

The only expandable system for the ZX81

The Personal Banking System is also available from the Buffer Shop, Streatham, London and Branches of the Computer Bookshop Group, full maintenance still available.

Two of the leading figures in the development of the Spectrum, Richard Altwasser and Steven Vickers, have cut their links with Sinclair and set up their own company

Secret plans laid by new company

TWO OF the leading figures in the development of the ZX Spectrum have cut their links with Sinclair Research to set up their own company.

Richard Altwasser, who designed the hardware, and Steven Vickers, who wrote the programs for the ROM working memory, have formed Rainbow Computing Co. Apart from publishing a book of programs for the Spectrum, the company plans are a closely-guarded secret.

"It is necessary for us to be very cagey and apart from the one thing which we have announced, we would like to leave anything we are doing secret until it is ready for launching," says Altwasser. He adds, however, that something will be announced before the end of the year.

They decided to make the move now because their major project for the last nine months, the Spectrum, had ended and, like many other people, they wanted to be their own bosses.

"We had plenty of freedom working at Sinclair but at the end of the day the company was run by one man and if a decision needed to be made, there was one man who took that decision," Altwasser says.

He and Vickers add, jokingly, that they had also been tempted by the money Clive Sinclair was making.

Altwasser 25, gained a degree in engineering at Trinity College, Cambridge and went to work for a micro-based automation company in Worcester but found the organisation too limiting. After 18 months he left and joined Sinclair Research in September, 1980.

He did some work on the development of the ZX-81 and after its launch in 1981 he was made responsible for computer research, which involved him in the design of the hardware of the Spectrum.

Altwasser has also been writing software for the ZX-81 and his 'Cambridge Collection' has sold 30,000 copies.

Before joining Sinclair he had a little knowledge of computing, owning a TRS-80 and having run a course in teaching Basic.

Vickers' knowledge, however, was much less. "Two years ago I did not even know what a ROM was," he says.

Vickers, 29, was also at Cambridge, gaining a degree in mathematics at King's College before doing his PhD at Leeds. In 1980, after writing to a number of computer companies, including Sinclair, for a job, he joined Nine Tiles, a software consultancy based near Cambridge, which had written the ROM working memory for the ZX-81.

His first job was the adaptation of 4K ZX-80 ROM to make an 8K ROM for the ZX-81. He also wrote the manual for the ZX-81 and went on to write most of the ROM for the Spectrum, as well as assisting with the manual.

Both say that they found working for Sinclair very exciting — "providing you can cope with the pressure without having a heart attack." The main difference they found between Sinclair Research and other companies in electronics was that "deadlines were very real deadlines". Vickers says:

"There is a definition of a deadline; that it is the date before which something should not be completed but that is not the case with Sinclair."

Development of the Spectrum was typical of the way in which Sinclair Research works. A rough specification was worked-out with the main requirements, including colour, high-resolution graphics and improved tape storage interface.

That was set last September with a final deadline of the Earl's Court Computer Show in April. By that time the Spectrum had to be ready to go into production, which meant that not only had all the development work to be done at Sinclair Research but also all the suppliers had to be chosen and the production lines at Timex had to be tooled-up.

That had to be done in conditions of great secrecy and very little infor-

'We had plenty of freedom working at Sinclair but at the end of the day if a decision needed to be made there was one man who took that decision'

Steven Vickers (left) and Richard Altwasser (right) in front of Trinity College, Cambridge.

mation leaked-out about the machine, although Altwasser says he was surprised by how much was known about it before the launch.

In the end, with many nights of working late, the deadline was met and the Spectrum launched on time.

Other benefits of working for Sinclair were that there was no shortage of money for research and, as it was a small company, it was easy to obtain quick decisions on new ideas and new ways of doing things.

"When I went for interview I asked about money being available if a piece of equipment was needed and was told that a request was never refused, but that they might advise about something which would be better," say Altwasser.

For the future, Vickers and Altwasser say they are concerned to prevent a Japanese invasion of the British market. Their plans for doing that, however, are to remain secret.

Asked if their name denoted any link with the Spectrum, Altwasser replies that the only connection was that it has been one of the suggestions for the new machine which they had liked, so had decided to use it.

One of their major concerns is that they should be able to keep pace with the latest developments in their field.

"There will always be the fear that something you have designed will be out-of-date as soon as you have finished it," he says.

They also think that the present generation of computer technologists will find increased pressure from today's schoolchildren. Altwasser says that teenagers are now able to grasp ideas with which he had difficulty less than three years ago.

He adds that at the Earls Court Computer Fair he saw some children with leaflets about the Spectrum. As a joke he decided to ask them about it and was told enthusiastically about its capabilities.

New ZX81 Software from Sinclair.

A whole new range of software for the Sinclair ZX81 Personal Computer is now available – direct from Sinclair. Produced by ICL and Psion, these really excellent cassettes cover games, education, and business/household management.

Some of the more elaborate programs can only be run on a ZX81 augmented by the ZX 16K RAM pack. (The description of each cassette makes it clear what hardware is required.) The RAM pack provides 16-times more memory in one complete module, and simply plugs into the rear of a ZX81. And the price has just been dramatically reduced to only £29.95.

The Sinclair ZX Printer offer full alphanumerics and highly-sophisticated graphics. A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions. So now you can print out your results for a permanent record. The ZX Printer plugs into the rear of your ZX81, and you can connect a RAM pack as well.

Games

Cassette G1: Super Programs 1 (ICL)
Hardware required – ZX81.
Price – £4.95.
Programs – Invasion from Jupiter. Skittles. Magic Square. Doodle. Kim. Liquid Capacity.
Description – Five games programs plus easy conversion between pints/gallons and litres.

Cassette G2: Super Programs 2 (ICL)
Hardware required – ZX81.
Price – £4.95.
Programs – Rings around Saturn. Secret Code. Mindboggling. Silhouette. Memory Test. Metric conversion.
Description – Five games plus easy conversion between inches/feet/yards and centimetres/metres.

Cassette G3: Super Programs 3 (ICL)
Hardware required – ZX81.
Price – £4.95.
Programs – Train Race. Challenge. Secret Message. Mind that Meteor. Character Doodle. Currency Conversion.
Description – Fives games plus currency conversion at will – for example, dollars to pounds.

Cassette G4: Super Programs 4 (ICL)
Hardware required – ZX81.
Price – £4.95.
Programs – Down Under. Submarines. Doodling with Graphics. The Invisible Invader. Reaction. Petrol.
Description – Five games plus easy conversion between miles per gallon and European fuel consumption figures.

Cassette G5: Super Programs 5 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £4.95.
Programs – Martian Knock Out. Graffiti. Find the Mate. Labyrinth. Drop a Brick. Continental.
Description – Five games plus easy conversion between English and continental dress sizes.

Cassette G6: Super Programs 6 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £4.95.
Programs – Galactic Invasion, Journey into Danger. Create. Nine Hole Golf. Solitaire. Daylight Robbery.
Description – Six games making full use of the ZX81's moving graphics capability.

Cassette G7: Super Programs 7 (ICL)
Hardware required – ZX81.
Price: – £4.95.
Programs – Racetrack. Chase. NIM. Tower of Hanoi. Docking the Spaceship. Golf.
Description – Six games including the fascinating Tower of Hanoi problem.

Cassette G8: Super Programs 8 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £4.95.
Programs – Star Trail (plus blank tape on side 2).
Description – Can you, as Captain Church of the UK spaceship Endeavour, rid the galaxy of the Klingon menace?

Cassette G9: Biorhythms (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – What are Biorhythms? Your Biohythms.
Description – When will you be at your peak (and trough) physically, emotionally, and intellectually?

Cassette G10: Backgammon (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £5.95.
Programs – Backgammon. Dice.
Description – A great program, using fast and efficient machine code, with graphics board, rolling dice, and doubling dice. The dice program can be used for any dice game.

Cassette G11: Chess (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Chess, Chess Clock.
Description – Fast, efficient machine code, a graphic display of the board and pieces, plus six levels of ability, combine to make this one of the best chess programs available. The Chess Clock program can be used at any time.

Cassette G12: Fantasy Games (Psion)
Hardware required – ZX81 (or ZX80 with 8K BASIC ROM) + 16K RAM.
Price – £4.75.
Programs – Perilous Swamp. Sorcerer's Island.
Description – Perilous Swamp: rescue a beautiful princess from the evil wizard. Sorcerer's Island: you're marooned. To escape, you'll probably need the help of the Grand Sorcerer.

Cassette G13: Space Raiders and Bomber (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £3.95.
Programs – Space Raiders. Bomber.
Description – Space Raiders is the ZX81 version of the popular pub game. Bomber: destroy a city before you hit a sky-scraper.

Cassette G14: Flight Simulation (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £5.95.
Program – Flight Simulation (plus blank tape on side 2).
Description – Simulates a highly manoeuvrable light aircraft with full controls, instrumentation, a view through the cockpit window, and navigational aids. Happy landings!

Education

Cassette E1: Fun to Learn series – English Literature 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Novelists. Authors.
Description – Who wrote 'Robinson Crusoe'? Which novelist do you associate with Father Brown?

Cassette E2: Fun to Learn series – English Literature 2 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Poets, Playwrights. Modern Authors.
Description – Who wrote 'Song of the Shirt'? Which playwright also played cricket for England?

Cassette E3: Fun to Learn series – Geography 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Towns in England and Wales. Countries and Capitals of Europe.
Description – The computer shows you a map and a list of towns. You locate the towns correctly. Or the computer challenges you to name a pinpointed location.

Cassette E4: Fun to Learn series – History 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Events in British History. British Monarchs.
Description – From 1066 to 1981, find out when important events occurred. Recognise monarchs in an identity parade.

Cassette E5: Fun to Learn series – Mathematics 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Addition/Subtraction. Multiplication/Division.
Description – Questions and answers on basic mathematics at different levels of difficulty.

Cassette E6: Fun to Learn series – Music 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Composers. Musicians.
Description – Which instrument does James Galway play? Who composed 'Peter Grimes'?

Cassette E7: Fun to Learn series – Inventions 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Inventions before 1850. Inventions since 1850.
Description – Who invented television? What was the 'dangerous Lucifer'?

Cassette E8: Fun to Learn series – Spelling 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Series A1-A15. Series B1-B15.
Description – Listen to the word spoken on your tape recorder, then spell it out on your ZX81. 300 words in total suitable for 6-11 year olds.

Business/household

Cassette B1: The Collector's Pack (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £9.95.
Program – Collector's Pack, plus blank tape or side 2 for program/data storage.
Description – This comprehensive program should allow collectors (of stamps, coins etc.) to hold up to 400 records of up to 6 different items on one cassette. Keep your records up to date and sorted into order.

Cassette B2: The Club Record Controller (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £9.95.
Program – Club Record Controller plus blank tape on side 2 for program/data storage.
Description – Enables clubs to hold records of up to 100 members on one cassette. Allows for names, addresses, 'phone numbers plus five lots of additional information – eg type of membership.

Cassette B3: VU-CALC (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £7.95.
Program – VU-CALC.
Description – Turns your ZX81 into an immensely powerful analysis chart. VU-CALC constructs, generates and calculates large tables for applications such as financial analysis, budget sheets, and projections. Complete with full instructions.

Cassette B4: VU-FILE (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £7.95.
Programs – VU-FILE. Examples.
Description – A general-purpose information storage and retrieval program with emphasis on user-friendliness and visual display. Use it to catalogue your collection, maintain records or club memberships, keep track of your accounts, or as a telephone directory.

How to order

Simply use the FREEPOST order form below and either enclose a cheque or give us your credit card number. Credit card holders can order by phone – simply call Camberley (0276) 66104 or 21282 during office hours. Either way, please allow up to 28 days for delivery, and there's a 14-day money-back option, of course.

sinclair
ZX81 SOFTWARE

Sinclair Research Ltd,
Stanhope Road, Camberley, Surrey, GU15 3PS.
Tel: Camberley (0276) 66104 & 21282.

To: Sinclair Research, FREEPOST, Camberley, Surrey, GU15 3BR.
Please send me the items I have indicated below.

Qty	Cassette	Code	Item price	Total
	G1: Super Programs 1	30	£4.95	
	G2: Super Programs 2	31	£4.95	
	G3: Super Programs 3	32	£4.95	
	G4: Super Programs 4	33	£4.95	
	G5: Super Programs 5	34	£4.95	
	G6: Super Programs 6	35	£4.95	
	G7: Super Programs 7	36	£4.95	
	G8: Super Programs 8	37	£4.95	
	G9: Biorhythms	38	£6.95	
	G10: Backgammon	39	£5.95	
	G11: Chess	40	£6.95	
	G12: Fantasy Games	41	£4.75	
	G13: Space Raiders & Bomber	42	£3.95	
	G14: Flight Simulation	43	£5.95	
	E1: English Literature 1	44	£6.95	

Qty	Cassette	Code	Item price	Total
	E2: English Literature 2	45	£6.95	
	E3: Geography 1	46	£6.95	
	E4: History 1	47	£6.95	
	E5: Mathematics 1	48	£6.95	
	E6: Music 1	49	£6.95	
	E7: Inventions 1	50	£6.95	
	E8: Spelling 1	51	£6.95	
	B1: Collector's Pack	52	£9.95	
	B2: Club Record Controller	53	£9.95	
	B3: VU-CALC	54	£7.95	
	B4: VU-FILE	55	£7.95	
	ZX 16K RAM pack	18	£29.95	
	ZX Printer	27	£59.95	
	Post & packing – *only* if ordering hardware		£2.95	

TOTAL £ ____

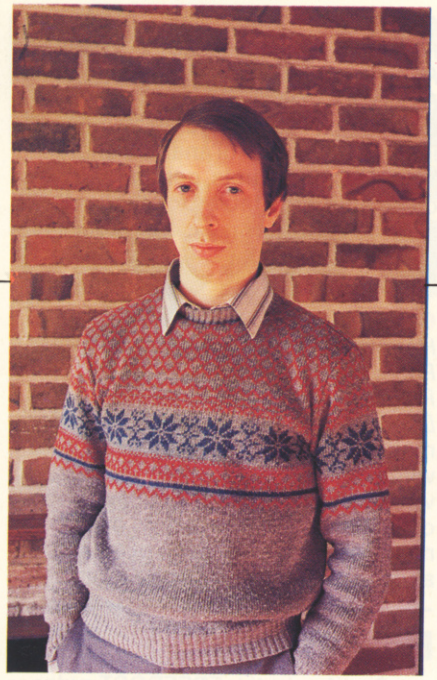
I enclose a cheque/postal order to Sinclair Research Ltd for £ ____

Please charge my *Access/Barclaycard/Trustcard no.
*Please delete as applicable.

Mr/Mrs/Miss

Address

NSA06



Andrew Hewson

Peripheral difficulties

Andrew Hewson answers more of your problems, including some worries about the Spectrum and possible add-ons

I RETURN to the knotty problem of transferring data between programs but first I have some questions concerning peripherals. Peter Mann of Bedfordshire writes:

I have been told that if I use my existing hi-fi cassette deck on the new Spectrum, the computer would blow up. Why should that be so? I would much rather use my expensive deck than have to try a 'cheap' portable tape recorder.

The Spectrum is a low-voltage device designed to detect and decode the kind of poorly-reproduced, low-voltage signal levels obtainable from the earpiece of a 'cheap' portable tape recorder. In contrast, a hi-fi system is designed to deliver an accurately-reproduced signal with sufficient power to fill a room with sound. Large voltage fluctuations are normal from a hi-fi system, even at low volume levels, and so connecting a Spectrum to a hi-fi system clearly risks over-loading the computer.

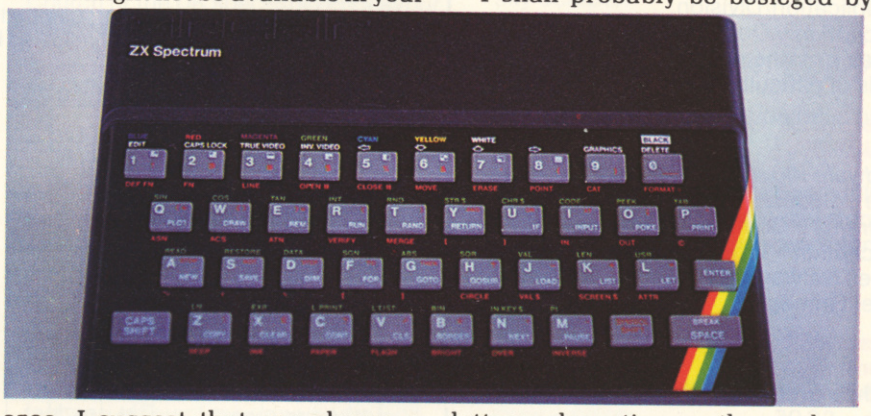
To make the most of a Spectrum, you need it on a large table or desk, with TV, cassette player, books, magazines, pencil and paper to hand. I can understand that you do not wish to spend money necessarily on a portable cassette player but I am sure you would find it much more convenient to use.

Recently I have bought a ZX-81 for business use and am thinking of buying a ZX printer. Is the printer suitable for printing ready-gummed labels? asks John Modha, of Greenford, Midlesex.

Unfortunately, the answer is no. The ZX printer is capable only of printing on the special aluminium-coated paper supplied with it. I suggest you look at advertisements, as one or two firms supply a printer interface which allows the ZX-81 to drive a conventional printer.

Alan Pitcher of Jersey says: **I have just ordered a Spectrum. Can you suggest a cassette unit to use with it?**

Sinclair has improved the cassette facilities markedly in the design of the Spectrum and so it is hoped that we will all find it much easier to use than the ZX-80 and ZX-81 in that respect. Instead of recommending a cassette player which might not be available in your area, I suggest that you choose a shop which sells a variety of players and take your computer, your TV and a typical cassette and make sure you can LOAD and SAVE before you buy. I have done that and found that shopkeepers are happy to help, provided you ask permission and explain the problem.



My advice to Peter Stokes of Great Missenden is similar. He writes: **I would like to replace the TV I use with my ZX-81 by a small monitor to obtain better video resolution. Can you advise me?**

I would not bother to use a video monitor. I have seen various TVs and monitors connected to ZX-81s and with some the picture is poor and with others very good. It does not seem to matter whether you use a video monitor or not.

My preference is for one of the Ferguson range of small black-and white portables, which I find give a very clear picture and which cope well with the interruptions in the signal caused by the FAST command.

I shall probably be besieged by letters advocating another make or model and so I repeat the advice to 'try before you buy'.

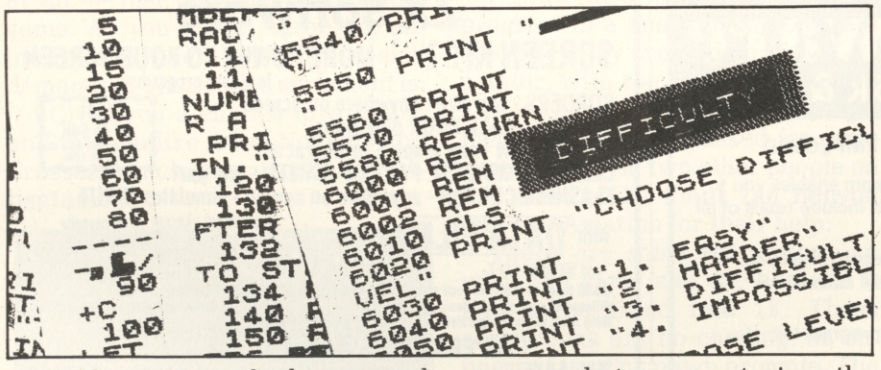
Geoffrey Ottley is going to the States for three years and he asks: **Will I be able to use my computer in the U.S. without further adaptation or will I need a new transformer?**

Electricity is supplied in the U.K. at 240V, 50 cycles per second, whereas in the U.S. the supply is at

120V, 60 cycles per second. Hence a U.S. power supply will be needed with an output of 9V DC and rated at 1.2 amps. It will also be necessary to use a TV made for the British market because U.K. TVs display 50 frames per second, whereas U.S. TVs display 60 frames per second.

The U.S. version of the ZX-81 is also rather better screened than the U.K. version, so if your new neighbours complain of interference on their TV you will have to put your computer in an earthed metal box. Perhaps it would be easier to buy a new ZX-81 on your arrival.

Now I return to a topic which has aroused a good deal of interest since I mentioned it two months ago. Readers of the first issue of *Sinclair User* will remember that I described two Basic routines for transferring data from a program, above RAMTOP, loading a second program from cassette and then transferring the data back to the variables area of the second program, thus enabling two programs to 'speak' to one another.



Les Auckland writes: **I would like to know how to SAVE and LOAD data only into a program held in core. Can you assist?**

There are two methods. The first is quick and elegant and consists essentially of writing new SAVE and LOAD routines in machine code. The second method is slow and clumsy but it is easy to understand and the necessary software is mostly in Basic, so I will explain it as the preferential method. The steps in outline are:

SAVE the data of interest on tape; to prevent the program in the ZX-81 being over-written, copy the program area above RAMTOP; LOAD the data from tape in the usual way; create some space in the program area and copy the program from above RAMTOP into the newly-created space in the program area.

Obviously, to create some data to LOAD into a program we must RUN a previous program to read in or calculate the data to be SAVE. The earlier program could be deleted line by line but the process is rather laborious, so use this technique instead:

First note the line number of the first line of the program. Suppose it is line number 10; then find the effective length of the program by entering PRINT PEEK 16396 + 256* PEEK 16397 — 16513.

Suppose the result is 1859. Then enter POKE 16511, 1859 — 256* INT (1859/256); POKE 161512, INT (1959/256); 10 or whatever was the first line number.

Do not attempt to LIST the program between entering the instructions or you will have to pull out the plug and start again. You are making the ZX-81 think that the whole program is one monster Basic line and if it attempts to LIST it all, it becomes confused. Entering 10, or whatever, deletes the monster line in the usual way.

The data can then be SAVEd, together with the display file and other odds and ends, on tape.

The second step is to LOAD a new program and store it above RAMTOP. The technique is very similar to storing data above RAMTOP which I have explained previously. Be sure to move RAMTOP down as explained on page 168 of ZX-81 Basic Programming before LOADing the new program. The following routine copies a program above RAMTOP:

```
10 LET J = PEEK 16396 + 256*PEEK
16397 — 17509
20 PRINT J
30 LET K = PEEK 16388 + 256*PEEK
16389
40 FOR I = 0 to J — 1
50 POKE K + I, PEEK (16509 + I)
60 NEXT I
```

The routine PRINTs the length of the program, J, in bytes. You should make a note of it because it will be needed later.

The data can then be LOADed from tape in the usual way. The current program will, of course, be over-written and so the final step is to copy it back from above RAMTOP. A machine code routine is needed for that step, because space must be created in the program area in which to store the program using a routine in ROM.

The routine is 20 bytes long and I suggest you store it at addresses 32748 to 32767 by entering and RUNning the following routine:

```
10 for I = 32748 to 32767
20 INPUT M
30 POKE I, M
40 PRINT I, PEEK I
50 NEXT I
```

Enter the following numbers one by one from the keyboard: 42, 12, 64, 229, 43, 1, 0, 0, 197, 205, 158, 9, 193, 209, 42, 4, 64, 237, 176, 201. You might like to determine how the routine works by translating the decimal numbers into Z-80 assembler using Appendix A of the ZX-81 Basic Programming manual.

Before running the machine code routine, POKE the program length, J, into it by entering

```
POKE 32754, J — 256*INT (J/256)
POKE 32755, INT (J/256)
```

Then delete the Basic routine, put the ZX-81 into FAST mode, and call the machine code routine by entering

```
IF USE 32748 = 0 THEN STOP.
```

© Hewson Consultants 1982.

● *Please address problems and queries to Andrew Hewson, Helpline, Graham Close, Blewbury, Oxfordshire.*

PERSONAL SOFTWARE SERVICES

MACHINE CODE GAMES

THE MOST EXCITING INTERACTIVE M/C ACTION AVAILABLE

0/3 BREAKOUT PLUS SUPERBREAKOUT **16k** — **£4.95**

TWO DIFFERENT VERSIONS OF THE POPULAR ARCADE GAME 2500 BALL SPEEDS PLUS A CHOICE OF THE NUMBER OF BALLS IN PLAY. MASTER BREAKOUT AND THEN GRADUATE TO SUPERBREAKOUT!

0/4 SPACE DEFENDER PLUS HI-RISE **16K** — **£4.95**

DEFEND YOUR MOTHER SHIP FROM THE ATTACKING FLEET OR TRY AND SAVE THE POPULATION OF A LONDON TOWER BLOCK FROM FALLING TO THEIR DEATHS.

1/8 TALLGUNNER **16K** — **£3.95**

AS REAR GUNNER OF A SPACE CRUISER YOU HAVE THE RESPONSIBILITY FOR FIGHTING OFF ENEMY ATTACKERS.

2/1 PUCKMAN **16K** — **£4.95**

A SUPERB FAST ACTION VERSION OF THE ARCADE GAME INCLUDING ALL ITS FEATURES. THIS PROGRAM DEMONSTRATES JUST HOW GOOD MACHINE CODE CAN BE.

2/2 MAZE DRAG RACE **16K** — **£4.95**

RACE THROUGH A GIANT MAZE (9 TIMES THE SIZE OF THE SCREEN) PICKING UP POINTS AS YOU GO BUT WATCH OUT FOR THE OTHER CARS, ROCKS, OIL AND ICE WHICH CAN "KILL" YOU! A REALLY SUPERB GAME – HIGHLY RECOMMENDED.

SPECIAL OFFER: ANY TWO PROGRAMS FOR ONLY £7.50 OR ANY THREE FOR £10.00.
THE ABOVE PROGRAMS ARE ONLY A SMALL SELECTION FROM OUR WIDE RANGE OF ZX81 SOFTWARE – ALL OF WHICH IS AVAILABLE THROUGH THE ZX SOFTWARE LIBRARY – SEND SAE FOR FULL DETAILS.

CHEQUE OR P/O TO: PSS, 112 OLIVER STREET, COVENTRY, CV6 5FE

ZX HARDWARE . . .

Professional 40 key keyboard

- All legends and graphics in 2 colours
- No soldering to ZX81, just plug in
- Proper typewriter keys
- RAM/Printer compatible.

Kit £19.95 Built £24.95 Case £10.20
Repeat key add on TBA.

Range of in/out ports, music boards, motherboards, D to A converter boards write for catalogue.

23 Way double sided, gold female edge connector, wirewrap type £2.95

Male connector £1.25
Ribbon cable £1.40 per metre

Mastering Machine code book £5.50
Programming for real applications £6.50
Tape for real applications £11.25

HARRIS & LOCKYER ASSOCIATES
(Sole distributors for Redditch Electronics)
Dept SU
33 Pedmore Close
Woodrow South
Redditch
Worcs.
Tel (0527) 24452

Prices included VAT + p+p
Overseas add £1.80 postage
Delivery 3 days for in stock items else allow 28 days.
Official orders welcome.
Send sae for free catalogue

ZX81 Software

Business Software 16k & 32k

FOR SMALL BUSINESSES AND THE SELF EMPLOYED

BUSINESS BANK ACCOUNT. This program enables you to make debits under 11 sub headings. Statements include totals of all sub headings.

PURCHASE LEDGER. Keeps a complete record of all your receipts under 11 sub headings. The program will calculate & deduct VAT.

SALES LEDGER. For all your invoices. The program will calculate VAT and list all outstanding invoices.

All the programs will except entries up to £99999.99 & will enable you to produce your accounts at the touch of a button. Programs can also be used if you are not registered for VAT.

16K programs accept up to 225 entries: **£8.75**
32K programs accept up to 675 entries: **£10.75**

Special Packs including all 3 programs: 16K **£25**; 32K **£30**.

VAT & PROFIT CALCULATOR: £3.50

Educational Software 16k

SPELLBOUND. Spellbound game for 1-4 players. Program will accept up to 600 words. Can also be used to test spelling. **£4.75.**

TRANSFORM LTD. For details send S.A.E. to
41 Keats Ho., Porchester Mead, Beckenham, Kent.
01.658.1661. Callers welcome.

TRANSFORM LTD.

ZX Software

SCREEN KIT 1 — MORE POWER TO YOUR SCREEN in Basic programs

BORDERS - any size - anywhere on screen
SCROLL - in ALL FOUR directions
FILL SCREEN - any graphic or character
CLEAR and REVERSE PART OF SCREEN - any part
FLASHING CURSOR - anywhere on screen - simulates INPUT

ZX81 4K to 64K most routines work on ZX80, 8K ROM

with **DATA FILES** and MEMORY LEFT

SAVE BASIC VARIABLES on cassette
LOAD back into ANY program
all at DOUBLE SPEED

- 880 bytes of machine code gives **INSTANTANEOUS SCREEN RESPONSE.**
- Becomes part of your Basic program.
- No need to Load separately.
- Can be added to existing program.

SUPERB VALUE £5.70 Inc VAT & P+P C.W.O.

ZX-MC — MACHINE CODE DE-BUG/MONITOR

At last, **COMPLETE FREEDOM FROM BASIC** for machine code programmers

- Versatile entry commands for Hex code and String entry.
- Comprehensive Run & De-bug commands, including REGISTERS DISPLAY & BREAKPOINTS.
- Hex dump to printer for hard copy.
- 16 essential commands for M/C programming.
- Occupies 2½K RAM in Basic area.
- Supplied on cassette with 36 page manual.

• SAVE, LOAD, VERIFY AT DOUBLE SPEED from any part of RAM.

- Fast machine code routines operating from Basic area of RAM.
- Write your M/C programs above Basic area - Screen memory (D-FILE) never moves.
- SELF CONTAINED design, for the serious programmer - cannot be used with Basic programs.

£7.50 Inc VAT & P+P C.W.O.

ZX81 4K to 64K ZX SPECTRUM version available soon

REM-LOAD — MACHINE CODE ENTRY/DE-BUG

- A version of ZX-MC without the SAVE/LOAD/VERIFY facilities.
- **ENTER, RUN, DE-BUG** machine code in Basic REM lines.
- Operates from above RAMTOP.
- Compatibility with Basic.
- Supplied on cassette with 30 page manual, for ONLY –

SAE for more details of software

£6.95 Inc VAT & P+P C.W.O.

ZX81, 16K to 64K ZX SPECTRUM version available soon

Picturesque

6 CORKSCREW HILL, WEST WICKHAM, KENT BR4 9BB
Mail order only – Allow 14 days delivery
PLEASE STATE COMPUTER MODEL

Philip Joy considers a game of chess written for the 1K ZX-81 and finds it is very restricted

Simple chess limits moves

TO DISPEL some confusion **about Noughts and Crosses,** I have received a letter indicating that I made two statements which contradict each other.

"If you have ever played a computer version of the game, it tends to be very easy to beat", was the first comment.

That statement refers to a version of the game which contains no skill at all — just the rules to play the game. As you would agree, an uninteresting game with little skill demanded. The second statement is:

"Gives you a chance to win now and then, unlike many Noughts and Crosses which are which are unbeatable . . . "

That one refers to what happens if you insert a large amount of skill — it becomes unbeatable and boring. If, however, you have the computer learn by your mistakes, as the article was suggesting, it will become more difficult as you play. That will give players a chance to win, providing that the player always plays to his normal standard.

I was also sent a 1K chess program in a neat package, with a cassette inlay created on the ZX-81 printer, with the instructions on it. The author is D Horne, Cowbridge, East Sussex. I have asked for some comments from two other people on the game and I thank Ian Benyon and Leo Amatino for their help.

There are some restrictions on what the game can do, because it had to be fitted into 1K. Those restrictions are no castling, no en-passant, and no pawn promote. The comment on those restrictions was that it spoiled the game. I shall stick out my neck and say what I have always said — that the unexpanded ZX-81 cannot do anything constructive, except be used to control something.

I must also say that after I have seen the game, my mind is not changed. The game is satisfactory for 1K but is nothing like what can be achieved on the ZX-81.

Amatino says he thinks it plays the same game, and both he and Benyon say that it was a very short game. Horne says it is the ultimate for the 1K ZX-81; I suppose that is true.

It is neatly packaged and costs £5. Amatino said that it was not worth the money. I would say that if you have a 1K ZX-81, you could have some enjoyment from this inexpensive game.

A Leicester reader sends details on the Artic Computing ZXchess II. He includes a game which I shall try to include in a future issue. His comments are rather interesting, as they support my point about the end game. He says:

"The end game is less positive". He says of the save facility of the game: "The most significant advantage of this particular program is the save facility".

A Cumbrian reader has sent a game played against Sargon 2.5 and ZXchess II. ZXchess won. He says that one bad move by Sargon clinched it. That is interesting, because I have a version of Sargon on my Video Genie computer and I have found it be be of reasonable standard.

I shall include some of the many games which have been sent to me when I have played them and can comment on them. One reader has sent a letter saying that he did not know chess games were implemented on such small computers; he must be surprised.

I hope you can send me details of anything to do with chess or mind games in general. Some comments on adventure games would be most helpful, as that is my interest, and I would like to know how other people feel about them.

HAVE YOU HEARD A ZX81 BLEEP?

NEW PRODUCT

ADD A NEW DIMENSION TO YOUR KEYBOARD

* The ZX81 Bleep provides feedback missing from touch sensitive keyboards
* Makes programming faster — more accurate
* 198 ZX81 characters bleep in fast and slow modes
* Fits inside case — no trailing wires
* Easy installation
* Simple plug-in connections
* No soldering required (no risk of damaging ZX81)
* Also suits many full size keyboards
* Illustrated instructions supplied.

ONLY £8.95 INCL VAT + P&P READY ASSEMBLED
(on/off switch available at £1 extra)

Cheques & P.O's to: BLEEP

FULCRUM PRODUCTS DEPT M.

Hillside, Steep Lane, Findon, W. Sussex BN14 0UF

ZX80 ZX81

JRS SOFTWARE

19 WAYSIDE AVENUE, WORTHING, SUSSEX, BN13 3JU
TELEPHONE WORTHING 65691 (Evenings and Weekends only)

CASSETTE profrssionally recorded by SOUND NEWS STUDIOS

GAMES PACK — *Beat this for value! 5 × 16K programs PLUS 2 × 1K programs* £4.95 ($9.90)

3-D Battle (M/code-1K) — Fast moving space battle with continuous count down of energy units left.

City Bomb (M/code-1K) — Destroy the buildings and land your plane. Your fuel has nearly gone and you circle the city lower and lower.

Warp Wars (Basic & M/code-16K) — Features realistic space craft moved by M/code for previously sold at Microfair with instant response. Sweet Tooth for £4.95)

Snake (Basic-16K) — A game of thought and skill. Pass through all the marked squares without crossing or doubling back on your path but watch out for the expanding black blob. previously sold at Microfair for £3.95)

Sweet Tooth (Basic & M/code-16K) — M/code routines used to move your fat face round the screen and gobble the sweets.

PLUS Slalom and Black Holes (previously sold together for £4.95)

An ESSENTIAL addition to your 1K RAM ZX81 (or ZX80 8K ROM)

TOOLKIT (written by PAUL HOLMES)
(Cursor shifts when ordering)

Provides the following additional facilities:

Line renumber — you state starting number and increment value.
Search and replace — changes every occurence of a character as you require.
Free space — tells you how many free bytes you have left.

SPECIAL GRAPHICS ROUTINES

Hyper graphics mode — graphics never seen on a ZX81 before.
Open — instantly sets up as many empty print lines as you require. (1K version only)
Fill — used in conjunction with OPEN fills your screen instantly with your specified character.
Reverse — changes each character on your screen to its inverse video.

TAPE ROUTINE — provides a system **WAIT** condition until a signal is received in the cassette ear jack — many uses !

All these routines are written in machine code and together take up only 164 BYTES of your precious RAM — an incredible achievement!!!

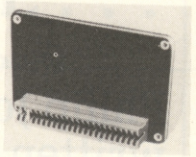
The price is incredible too! ONLY **£3.95 ($7.90)** for cassette, including FULL instructions and example programs.

ALSO available 16K version ONLY **£4.95 ($9.90)** which includes all the above PLUS GOTO's and GOSUB's included in line renumber.
Search for and list every line containing specified character. **16K VERSION**

As reviewed in *'YOUR COMPUTER'* March 1982

16K RAM PACK
£29.95 ($59.95)

Quite simply the best available + FREE 'Alien Attack' (7K-M/Code) on cassette — Value £5.75



Fully built, tested and guaranteed.
Uses existing power supply (min. 600 m.a.)
Compatible with printer.
No wobble problems.
Gold plated edge connector for perfect contact with your ZX81.
Normally despatched within 10 days of receipt of your order.

With advances in microtechnology we are now able to offer the **64K RAM PACK**. Same quality as the 16K to give massive memory to your ZX81 with external dimension no larger than the 16K RAM Pack (Above).

ONLY £62.95 ($125)

NEW **GRAPHICS TOOLKIT** (Another masterpiece by PAUL HOLMES)

22 exciting MACHINE CODE routines that give you control over your screen as never before !

(ZX81 - 16K RAM ONLY)

DRAW/UNDRAW draws or deletes your multi-character shape which is defined in a REM statement. You may define as many different shapes as you like and draw or undraw each at will at whichever screen position you choose.

FOREGROUND ON/OFF use this to 'protect' existing characters on your screen. When on new shapes will appear to slide behind and re-emerge from other shapes.

BORDER/UNBORDER Draws a border round the edges of your screen area. Edit lines can be used if required. Your border is protected when foreground is on.

FILL Fills any number of lines you specify, starting at any line you specify, by your chosen character.

REVERSE Converts all characters to their inverse video, control as in FILL.

PRINT POSITION CONTROLS
UP, DOWN, LEFT, RIGHT — Alter your next PRINT position in the direction indicated.

Alter your next PRINT position in the direction indicated

SCROLL facilities
UPSCROLL, DOWNSCROLL, RIGHTSCROLL, LEFTSCROLL — Scroll your screen in the direction indicated

ONSCREEN/OFFSCREEN turns your screen on or off.

BACKGROUND ON/OFF
Fills your screen by your specified character. When foreground is on existing information is unaffected and shapes will appear to pass in front of your background, without deleting it.

SEARCH AND REPLACE will search the screen for every occurence of the character you specify and replace it with your new character.

SQUARE draws a square or rectangle from your specified co-ordinates.

ALL these routines are in machine code for SUPER-FAST response ! Simply load GRAPHICS TOOLKIT, which repositions itself at the end of your RAM, and then your own program (or key in a new one). GRAPHICS TOOLKIT uses only 2K of your RAM and that includes space to load the programmers TOOLKIT described above (16K RAM version)

ALL FOR ONLY £5.95 ($11.90) (amazing value from JRS)

This includes a cassette with 2 copies of the program plus a comprehensive instruction booklet with examples.

NOTE: All prices are fully inclusive — send cheque or P.O. to JRS Software at above address

OVERSEAS CUSTOMERS PLEASE NOTE Payment may be made in Sterling (Money Order available at your bank) or $U.S. (U.S.A. customers only). Prices quoted above are also export prices and include AIRMAIL postage.

TAURUS COMPUTER DESIGN

announce these new products for the discerning ZX81 user.
All fully guaranteed.
As seen at the Computer & Microfairs

TAURUS 8K EPROM UTILITIES MODULE

With EPROM you can forget the problems involved in loading the ZX81. Programs are instantly available at switch-on.

* Module fits neatly inside the computer. Fills memory space between 8K and 16K. Runs from computer power supply.
* A type 2732 4K EPROM loaded with the brilliant TAURUS machine code utilities package, acclaimed by experts as the best available. Machine code MONITOR containing 16 software utilities to help you develop and debug your own programs.

Utilities include:
* **Memory byte display and alter**
* **Register display and alter**
* **Word fill memory**
* **Block copy**
* **Generation of a REM statement**
* **Tabulated memory display with addresses**
* **Viewable user screen separate from monitor display screen**
* **Hex to decimal and decimal to Hex converter**
* **Routine to enable user to write his own utilities in RAM**
* **Facilities to run machine code and set breakpoints**

Also in the package is the new TAURUS machine code DISASSEMBLER.

A type 2732 4K EPROM to give you the ability to develop and save your own permanent programs which can be instantly loaded.

Comprehensive User Manual. **Price: £30.00**

WORDPROCESSING on ZX81, another facility of the 8K EPROM Board.

A 4K EPROM loaded with 2 character sets

* Set 1 Lower case characters
* Set 2 Upper and lower case characters
* Ability to change character shape of any key
* Space in PROM for 5 character sets
* Inverse of any character set still available

Price: £10.00

TAURUS MACHINE CODE MONITOR AND DISASSEMBLER AND CHARACTER SET also available on cassette with user manual @ £8.75p, £6.50p and £6.50p respectively.

TAURUS unique lay flat 16K Ram Pack with switchable 2K EPROM loaded with either machine code monitor or available for your own programs.
Price: £48.00 or £38.00

Send for details or cheque with order to
TAURUS COMPUTER DESIGN
47 High Street, Baldock,
Hertfordshire, SG7 6BG
Telephone Baldock
(0462)893900

NEW

ZX 81 16K SOFTWARE

DIGGLES KITCHEN

SIMPLE SUPPERS TO CELEBRATION DINNERS

VOLUME 1

50 PAGES OF WORLDWIDE RECIPES
£4.99 (inc. P&P and VAT)

VOLUME 2

50 PAGES EUROPEAN RECIPES
£4.99 (inc. P&P and VAT)

Special price for two volumes
£9 (inc. P&P and VAT)

More volumes to follow
Please specify which volume(s) – Mail order only

Send remittance to:-

MICRO COMPUTER SOFTWARE
Unit D6, Pear Industrial Estate, Stockport Road, Lower Bredbury, Stockport SK6 2BP. Tel: 061-494 2441

ZX81 16K

TASWORD

WORD PROCESSING ON THE ZX81!

Your ZX81 becomes a word processor with TASWORD. Type in letters, documents and pictures, store them on tape, and edit and update existing documents. With a printer, which is not essential, you can print your documents.

TASWORD FEATURES INCLUDE

- **OVER 300 LINES** of text in a text file.
- **CURSOR CONTROL** and auto repeat on all keys.
- **SCROLL** up and down through the text file.
- **AUTOMATIC** word-wrap and right-justification.
- **FULL ZX81** character set including inverse characters and graphics symbols.
- **INSERTION AND DELETION** of lines and characters.
- **A HELP PAGE** onto the screen at the touch of a key.
- **CENTRE** text on the screen, and move text left and right.
- **REFORMING** of edited text to a neat layout with a single keystroke.

TASWORD TUTOR

We send you a manual and a cassette. One side contains TASWORD. The other side contains TASWORD and TASWORD TUTOR. This teaches you word processing using TASWORD. No programming knowledge is required to use TASWORD.

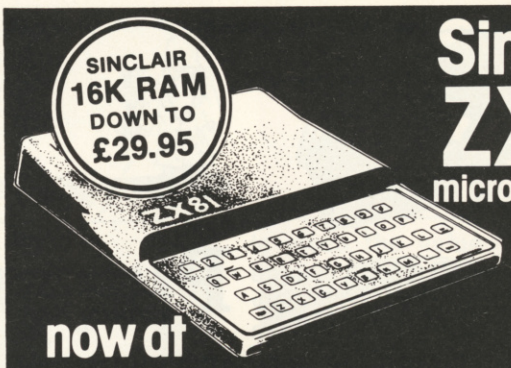
£6.50 fully inclusive

Mail order only. Allow up to 14 days delivery.

Please make cheques/P.O. payable to

TASMAN SOFTWARE

17 HARTLEY CRESCENT, LEEDS LS6 2LL



Sinclair ZX81 microcomputer

now at Cambridge Computer Store!

ZX81 Assembled	**£69.95**
ZX81 Kit	**£49.95**
16K RAM	**£29.95** *NEW PRICE*
Printer	**£59.95** *NEW PRICE*

All units now in stock
Wide range of books, software
and DCP packs also available
in our 'Budget Micros' department.

Cambridge Computer Store

1 Emmanuel Street, Cambridge CB1 1NE
Phone (0223) 358264/65334

Also: Acorn Atom • VIC-20 • Tandy TRS-80

ZX81 HEWSON CONSULTANTS ZX81

HINTS AND TIPS FOR THE ZX81 by Andrew Hewson £3.95

The most complete book at the price

"Good value and quite fascinating.... a very inexpensive way of acquiring months of programming experience" Your Computer Nov 1981

80 pages explaining how to squeeze a computing quart out of a Sinclair pint pot. Saving Space – vital reading for all ZX81 users.
Understanding the Display File – using the display file as memory, clearing a part of the display, using tokens in PRINT statements. Converting ZX80 programs – explaining simply but comprehensively how to convert the hundreds of published ZX80 programs. Chaining programs – revealing techniques for passing data between programs, calling subroutines from cassette and establishing data files. Machine Code Programs – all you want to know about ZX80 machine language. Explaining how to write, load, edit and save machine code and how to debug your routines. Routines and programs are scattered liberally throughout the text and the final chapter consists of 12 useful, interesting entertaining programs such as LINE RENUMBER, BOUNCER, SHOOT, STATISTICS, etc.

64K MEMOPACK

0-8K – *Same as 48+8K.
8-16K *Can be switched out in 4K blocks to leave room for memory mapping and vacant addresses for graphics etc ROM(s). The contents of this area of RAM are unaffected by loading programs from cassette. Can be used to store machine code routine or to store data for use by more than one program.
16-32K *Same as 48+8K.
32-64K *Same as 48+8K.

£79.00

LINE RENUMBER NEW! £4.95

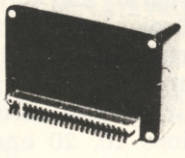
We all know the problem: you are developing a program – adding lines; deleting lines, correcting lines – and in no time at all you have run out of gaps between line numbers in which to add a new routine.

NOW! Use your LINE RENUMBER to tidy your program.

Before loading your program enter two simple commands and load LINE RENUMBER from the cassette. Now Load your program from the keyboard OR from cassette and LINE RENUMBER is instantly available.

Features
* Uses a step size of your choosing
* Renumbers GOSUBs and GOTOs
* Uses just ½K of your valuable RAM
* LOAD and SAVE your programs in the normal way with LINE RENUMBER available for instant use.

16K MEMORY



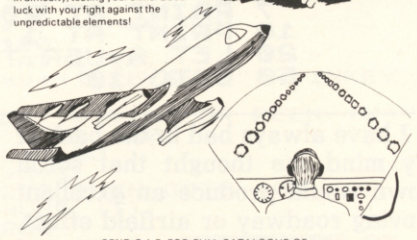
THE BEST VALUE FOR MONEY 16K RAM on the market. Coming complete with case, simply plugs into the port at the back of your Sinclair. Money back guarantee.

£26.95

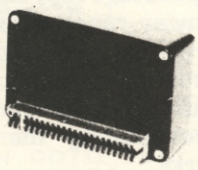
PILOT ★ £5.95

★ NEW!

New and exciting, Pilot challenges you to take off, fly between beacons, then land whilst watching wind speed and dodging craggy mountains – either could lead to disaster! If you take the challenge, you may soon learn to fly solo – so detailed are the flying instructions. Coast along in Autopilot – jut to gain confidence, then battle your way through 6 further modes, 6 different ways of trying to steer your plane safely back to base, increasing in difficulty, testing your skills. Good luck with your fight against the unpredictable elements!



48+8K NEW



0-8K *Sinclair Rom
8-16K *The contents of this area of RAM are unaffected by loading programs from cassette. Can be used to store machine code routine or to store data for use by more than one program.
16-32K *Basic program area and display file.
32-64K *Variable and array area. Massive memory area for storage of data.
*Directly addressable and user transparent.
*Facts sheet FREE with each RAM purchased.

£61.95

PROGRAMMERS TOOLKIT £6.50

The Programmer's Friend and Slave! Are you writing your own programs for the ZX81? How can you do that without our Toolkit? It will encourage you to go on to write bigger, better and more sophisticated programs by doing your donkey work.

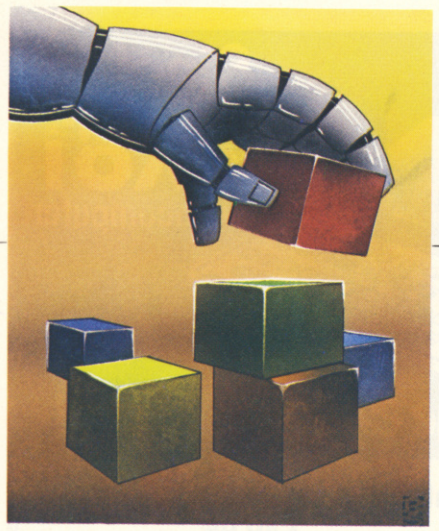
Simply create 3K of space above Ram top and then load the Toolkit in the normal way. The Toolkit hides above the Ram top awaiting your command. You can now load existing programs from cassette for the Toolkit to operate on. Or type in a whole new program!

Toolkit functions include:
* RENUMBER including the destination lines of GOTO's and GOSUB's, START and Finish lines and Step size specified by you.
* DELETE part or all of a program at your command.
* REPLACE character(s) or token(s) with an equal number of others specified by you.
* EDIT to creat sub routines at a stroke by moving blocks of basic program lines.
* FIND a basic program string specified by you.
* INPUT prompts for a two digit hexadecimal code and pokes it in at a specified address.
* Separate version available for 48+8 and 64K memories (resides at 8192).

"STOP PRESS PUCKMAN £5.95"

SEND S.A.E. FOR FULL CATALOGUE OF HARDWARE, SOFTWARE & LATEST PRICES

Cheque with order or quote Access or Barclaycard number to: **HEWSON CONSULTANTS**, Dept SU, 60A St Mary's Street, Wallingford, Oxon OX10 0EL.



Playing games with machine code

In the last of his three articles Mike Biddell looks at ways of using machine code in game simulation

IN THIS FINAL article we examine how our simple machine code routine scroll down can be used to good effect, to produce a game simulation. We will examine how a supporting program written in Basic can call the USR routine to maximum effect and how the whole program can be built and tested stage by stage. A logical procedure to adopt at this stage is:

Decide the game appearance, strategy and rules. This must be considered in the context of scroll down, since we intend to use the routine we have developed.

Produce a series of statements concerning the program flow and operation. For a program as small as this, a full-blown boxed chart is considered unnecessary by the author.

Using the statements, build-up the program piece by piece, testing as you proceed for the desired effect.

Soak test the entire program for several hours, by letting your friends, acquaintances and children loose on it. If there are any undiscovered bugs they will find them.

Figure 1: MAIN PROGRAM LOOP

```
   1 REM E£RND)?■; FAST ■57( CLE
AR FAST SGN LPRINT :<■5$4 PRINT
TAN MMMMMMMMMMMMMMMMMMMMMMMMMMMMM
MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
MM
   3 LET T=16514
   7 PRINT AT 20,9;"**RUNWAY**"
  10 PRINT AT 1,10;"■   .   ■"
  20 LET A=USR T
  50 GOTO 10
```

I have always had in the back of my mind the thought that scroll down would produce an excellent moving roadway or airfield effect, so we will build the game around that idea. If you have other ideas for applications of the routine, feel free to pursue them. Here is my concept of the game plot.

It is war-time and you are flying a transporter aircraft to land supplies behind enemy lines. As the runway approaches, you can see that it is mined but it is too late at that stage to pull up, since your airspeed is too low. You have, therefore, to land and taxi around the mines to take off again and see the runway recede.

If you hit a mine or go off the side of the runway, the aircraft crashes. It sounds exciting, so let us proceed to the statement portion of our development plan and produce a series of statements about how the program might flow and operate.

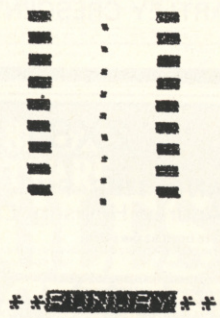
Main program loop, using PRINT AT function to produce the runway element. Call USR to scroll that element downwards. Put the USR call in a loop and that should produce a moving runway effect.

Add the aircraft path by adding a POKE statement into the loop. Allow the aircraft to be steered left and right by using inkey $ to modify the POKE address. Scroll down should create a plot of the previous positions of the aircraft.

Within the loop, POKE the mines on to the runway, in varying positions. Add the logic for a mine or verge collision. That should send the program pointer outside the loop for a comment and game re-start.

Add program to advance the taxing speed of the aircraft as it proceeds. Finally, incorporate program lines to signify a win; create a receding runway and a jump outside this loop to comment on the win and allow game re-start.

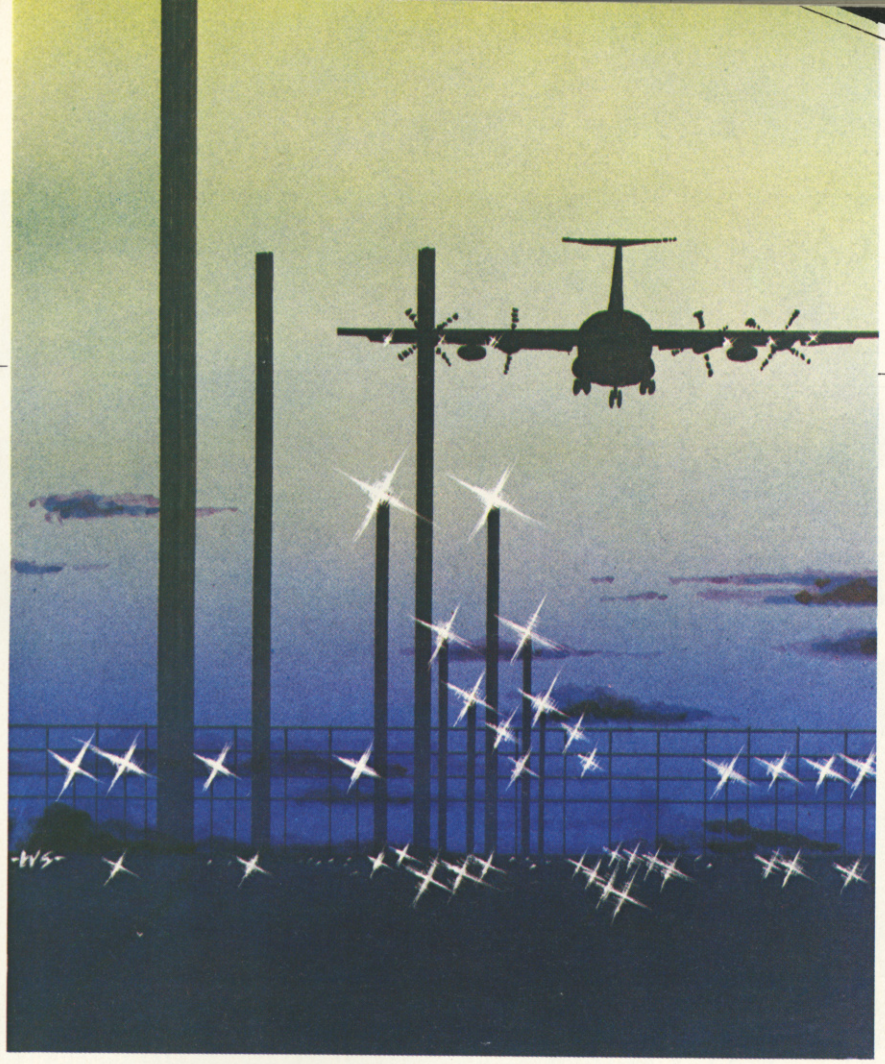
Figure 2: VDU PICTURE CREATED BY MAIN PROGRAM LOOP



Now let us make a start with the main program loop. Delete lines 10, 20, 30 and 40 of the scroll down test program and add lines 7, 10, 20 and 50 as shown in figure one. Line 7 prints the game title on line 20 of the screen; that is not scrolled, since our routine scrolls only 19 lines. Lines 10, 20 and 50 produce the approaching runway effect — study this three-line loop carefully.

Then run the program and you should see, if all is well, the runway approach. Press BREAK before the runway reaches the bottom of the screen and you will have a VDU picture similar to that shown in figure two. Our main program loop incorporating the machine code works.

Now add the aircraft path and some means of steering it. I have



chosen an asterisk (*CHRS(23)) to represent the position of the craft at any time. Since we will be POKEing the asterisk into the display file we will have to locate it, as described previously, by PEEKing system variables 16396 and 16397 and using those to define a variable W.

Then add the following lines to the developing program:

4 LET V = 411
5 LET W = PEEK 16396 + 256* PEEK 16397
30 LET V = V + (INKEY $ = "8")— (INKEY S = "5")
40 POKE W + V, 23

Variable W in line 5 defines the start address of the display file and variable V in line 4 is the displacement to be added, to position the asterisk in the correct place on the screen.

The POKE statement in 40 places the asterisk on the screen, directly below the runway. The value of V was determined by trial and error.

The steering logic is in line 30. It uses inkey $ to decode keys 5 and 8 on the keyboard — the keys with the left and right arrows. That works on the basis that if inkey $ = "8", then the whole expression inkey $ = "8" is given the value 1 (true). That applies to inkey $ = "5" in the same way. Thus, if inkey $ = "8", that adds 1 to variable V and moves the screen POKE one position to the right; if inkey $ = "5" it is moved to the left.

Then run the program with these additions and you can steer the aircraft from left to right. With its controlling logic, you can steer it anywhere you like, including off the runway.

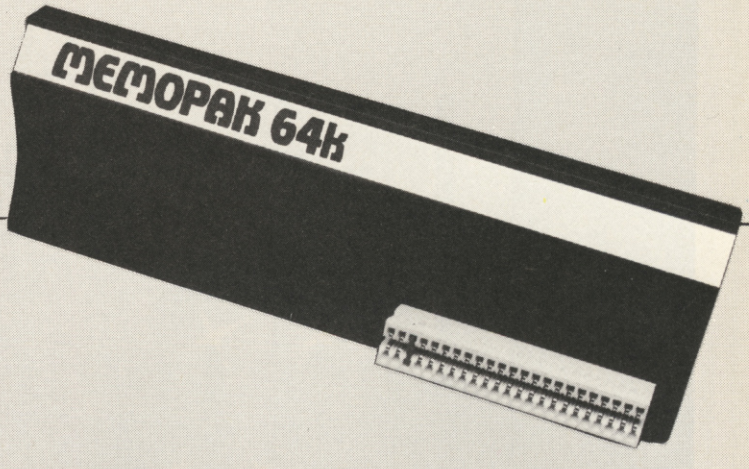
We have covered items one and two of the main program specification and I have been doing all the work. It would be excellent practice for you to add your own program lines and complete the program; test them carefully as you proceed.

For those who feel less inclined to tackle the task, a completed program — it is only one solution — is presented in figure three. Compare the additional lines to the rough program specification and you will begin to understand how it operates. To be frank, I have not yet managed to get the aircraft back off the runway. Is it possible? Perhaps with more practice I might make a better pilot.

In conclusion, if you have followed the articles, you have a mini-machine code loader and an understanding of how to write simple machine code and incorporate them in a Basic program. It is not too soon to be thinking about your next machine code challenge.

Figure 3: "RUNWAY" — COMPLETE PROGRAM LISTING (Basic and Machine Code)

```
    1 REM E£RND)?"; FAST "57( CLE
AR FAST SGN LPRINT :("5$4 PRINT
TAN MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
MM
    2 LET S=0
    3 LET T=16514
    4 LET V=411
    5 LET W=PEEK 16396+256*PEEK 1
6397
    6 CLS
    7 PRINT AT 20,9;"**RUNWAY**"
   10 PRINT AT 1,10;"  .  "
   20 LET A=USR T
   21 LET R=INT (S/10)
   22 IF S-R*10=9 OR S-R*10=6 OR
S-R*10=4 THEN POKE W+V-33*INT (V
/33)+99,52
   30 LET V=V+(INKEY$="8")-(INKEY
$="5")
   35 IF PEEK (W+V)=3 OR PEEK (W+
V)=52 THEN GOTO 100
   40 POKE W+V,23
   41 IF S=100 THEN LET V=V-66
   42 IF S=150 THEN LET V=V-33
   43 IF S=200 THEN LET V=V-99
   44 IF S=250 THEN GOTO 250
   45 LET S=S+1
   50 GOTO 10
  100 POKE W+V,61
  110 PRINT AT 21,0;"TOO BAD YOUR
E DEAD REPLAY Y/N?"
  120 INPUT Y$
  130 IF Y$="Y" THEN RUN
  140 GOTO 120
  250 PRINT AT 1,10;"        "
  260 LET V=V+(INKEY$="8")-(INKEY
$="5")
  270 IF PEEK (W+V)=3 OR PEEK (W+
V)=52 THEN GOTO 100
  280 POKE W+V,23
  290 LET S=S+1
  300 IF S=270 THEN GOTO 400
  310 LET A=USR (T)
  320 GOTO 250
  400 PRINT AT 21,0;"WELL DONE RE
PLAY Y/N?"
  410 INPUT X$
  420 IF X$="Y" THEN RUN
  430 GOTO 410
```



Win a printer and a Memopak 64K

We thank readers for all the entries to our previous competitions. No matter what the subject, it seems that readers of *Sinclair User* have little difficulty in meeting the requirements. Many of the tie-break lines are most ingenious.

For our fourth competition we again offer a printer but this time couple it with a 64K Memopak from Memotech of Oxford.

In line with our policy of fitting the competition to the prize, we would like you to write a program for 48K RAM. All entries must be on cassette and accompanied by a typed or beautifully-handwritten listing.

Your entry must reach us by July 12.

As a tie-break, should one be necessary, we want you to write a slogan beginning with the words: "I bought my ZX-81 because....."

The usual rules about the editor's decision being final, and employees of ECC Publications being ineligible, apply.

ENTRY FORM

Complete this slogan, which will be used as a tie-break: I bought my ZX-81 because.....

Name.....

Address.....

.....

Send your entries to ECC Publications, 30-31 Islington Green, London N1 8BJ to arrive not later than July 12.

ZX81 SOFTWARE

ALTERNATIVE PROGRAMS (1-16K)
FOR THE MORE DISCERNING ENTHUSIAST!

CASSETTE 1

MATHS ONE (16K)
ATTENTION ALL PARENTS! Prompted by an article in Practical Computing (Jan 81) on inferior maths software, we decided to produce a program that would give your child more than the boring reply: "sorry you are wrong, try again!" MATHSONE will give your child sums in the normal way and actually show your child where he/she has gone wrong. Note the whole sum is printed on the screen just as the child would do with pen and paper!

MATHSKATE (16K)
See whose rollerskater can reach the post first but the sums become more and more difficult!

Mathsone + Mathskate.....£3.95

CASSETTE 2

LANGUAGE TRANSLATOR
Having difficulty with foreign text? Then this is the program for you! Fast word for word translation, from 600 words in seconds. Words can easily be changed and SAVED on tape. Please state language choice.

WORD TEST
For the very junior members of the family-WORD TEST will give children partially completed words. Second trys are allowed and the score out of ten with correct answers are shown.

Language Translator + word Test.....£3.95

CASSETTE 3

BANK ACCOUNT (16K)
Why wait for a statement when you can have your own personal banking system! Accepts standing orders in the usual way and will tell you when your balance is below the free banking limit, then actually charge you for it! Just like the bank! Statements can be backdated and up to 150 transactions can be stored!

HOME BILLS READY RECKONER
Want to know if your electricity/telephone/net pay are correct?

Bank Account + Ready Reckoner.....£3.95

PLEASE NOTE: Our software is of the very highest quality and stands to compare with the very best from the Sinclair stable and even if we say so ourselves exceeds that standard.
No knowledge of computing required, just load and run!

YOUR ORDER IS RECEIVED AT 8.30 AND IS DESPATCHED BY 12.30 THE SAME DAY 14 DAY MONEY BACK GUARANTEE IF NOT SATISFIED + 6 MONTH REPLACEMENT GUARANTEE.

Make cheques, P.O. etc payable to:

FUTURESOFT

38 PENSHURST ESTATE, PRINCE OF WALES ROAD, LONDON, N.W.5.

FOOTBALL MANAGER

Addictive Games

for
ZX81
ZX80
TRS80
VIDEO GENIE

JUST LOOK AT THESE FEATURES

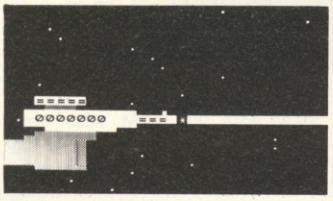
★ *AS MANY SEASONS AS YOU LIKE* ★ *4 DIVISIONS* ★
★ *PROMOTION & RELEGATION* ★
★ *FULL LEAGUE TABLES* ★
★ *TRANSFER MARKET* ★
★ *INJURIES* ★
★ *7 LEVELS OF PLAY* ★
★ *SAVE GAME FACILITY* ★
★ *MANAGERIAL RATING* ★
★ *PICK YOUR TEAM FOR EACH MATCH* ★ *F.A. CUP* ★

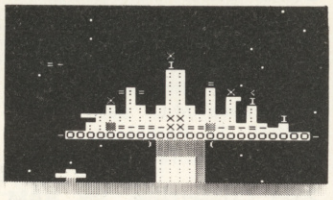
This is NOT a mere simulation. This is an exciting and highly enjoyable game in which you play the part of a Football Manager coping with the problems and decisions involved in running your club. There are so many features it is impossible to list them here but included are form (top teams NORMALLY win), giant-killings, wage bills to pay, and you can even be sacked! It is a game requiring a great deal of skill, and people play it for literally hours on end (we have proof!).
WE GUARANTEE that this is one of the best computer games you've ever played!
BUT BEWARE, this game is extremely addictive!

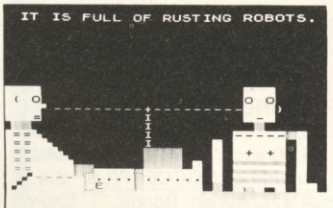
FOOTBALL MANAGER - *IS SUPPLIED WITH INSTRUCTIONS*
- *OCCUPIES THE ENTIRE 16K RAM*

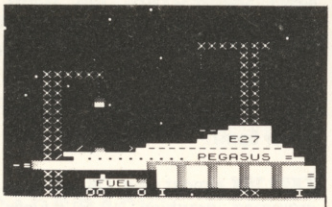
HARDWARE REQUIRED	
ZX81/ ZX80	*TRS80/ Video Genie*
8K ROM 16K RAM	*LEVEL II 16K RAM*

To Order send Cheque/P.O. £7.95 *made payable to: ADDICTIVE GAMES at: Dept S.U. P.O. BOX 278 CONNIBURROW MILTON KEYNES MK14 7NE PLEASE STATE COMPUTER*









TRADER

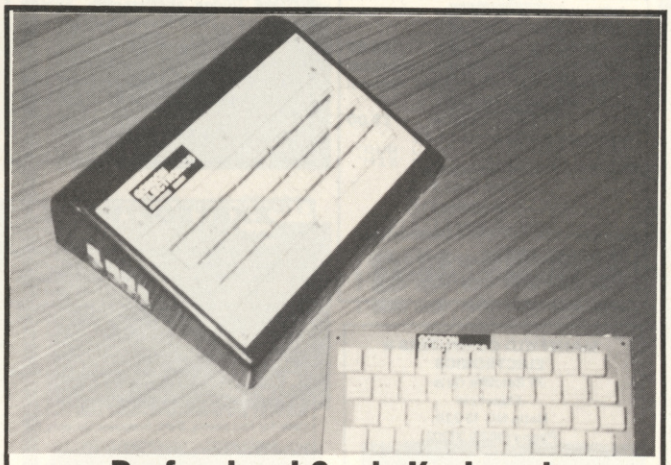
It is hard enough to look at an amorphous hydrosilicon blob from Psi, never mind swing a deal with one. But when they ask to pick your brains, do you really know what they have in mind . . . ?

'Trader' is a new concept in ZX81 games. It is a graphic adventure so big that it fills your 16K Ram three times. You are an intergalactic trader and the life is tough, the bargaining hard. You can make a fortune or end up spaced out in a Deltan hellhole.

"Trader'. 48K of adventure that will run in your 16K Ram. It costs £10.50 inclusive. Send SAE for more details of Pixel games.

PIXEL

Pixel Productions 39 Ripley Gdns. London SW14 8HF.



Professional Grade Keyboard and Case at Unbeatable prices

*Our case takes the ZX-81 printed board
*Keyboard supplied fitted to case
*Your Ram Pack plugs into rear of case
*Assembled Keyboard and case price £36.00
*Keyboard complete with ribbon cable & connectors
*No soldering required
*Large keys are used with changeable keymarkers
*Keyboard ready assembled price £24.00

Sinclair makes the best home computers and we make the best keyboards

**Full money back guarantee if you are not fully satisfied*
Prices include VAT

*16K Ram Pack — fully tested, ready built and in a case. Uses existing power supply. *STAR BUY - £28.00 *

Mail Order Address:
GORDON ELECTRONICS
76 Mountbatten Road,
Braintree, Essex CM7 6TP. Telephone (0376) 26048.

Please add £1.50 P&P. Make cheques payable to GORDON ELECTRONICS

sinclair supermart

ZX81 DATABANK 16K
Serious Programs from SANDERSON SOFTWARE

* 3 programs on one tape
* Create your own layout
* Vocabulary Keyword feature
* Add, Sort, Search, Delete your own Databank
* Change Data by Cursor Select

Many Serous Uses: Job/Work Programming Multiple Indexing Disco/Music Library, etc.

£5 incl. p&p and documentation

P.O. or Cheques to:
D. Sanderson, 1 Manor Court, Breaston, DERBY DE7 3AW.

****
ZX80/ZX81
SOFTWARE
****

ZX Adventure Tape 1 **£5.00**
Greedy Gulch, Pharaohs Tomb, Magic Mountain – 16K RAM required.

The Nowotnik Puzzle & Other Diversions **£5.00**
Three original programs to puzzle and infuriate! Includes a fast interactive demolition game. 16K RAM.

ZX81 Pocket Book **£5.95**
136pp of programs, articles, useful subroutines, plus create your own Adventures!

Atom Business **£6.95**
Twelve programs for the expanded Acorn Atom – sales graph, nominal ledger plus much more.

ZX81 Pocket Book Cassette **£5.00**
Atom Business Cassette £8.62

Mail order: **Phipps Associates**
Mail Order Dept. F
99 East Street
Epsom, Surrey KT17 1EA

Phone Access/Barclaycard orders
Epsom (03727) 21215

MANSFIELD COMPUTERS & ELECTRONICS
79 Ratcliffe Gate
Mansfield
Notts NG 18 2JB.
Phone (0623) 31202.

Stockists of GENIE, ATOM, VIC 20, ZX81. Plus large range of software, accessories & books.

SPECIAL OFFER
ZX81 PRINTER PAPER.
TOP QUALITY.
6 rolls for only £10.95 inc. VAT, p&p.

"EEBEE"

"AT LAST", a serious money making program with self check and file storage. 4K. **£8.95.**

"SAILING", fight winds, currents, hazards, adjust sails and rudder to reach harbour before storm breaks. 8K. **£3.95.**

For ZX81/Spectrum. Quality tapes, error free.

Cheque, P.O. to "EEBEE"
"EEBEE" Computer Wares,
20 Winstree Basildon,
Essex SS13 1PG.

EDUCATIONAL SOFTWARE ZX81 (16K)
G.C.E. "O" LEVEL FRENCH: 3 (16K) programs Grammar plus 3 (16K) programs Vocabulary.
G.C.E. "O" LEVEL MATHS: I (16K) teach and test program plus 2 (16K) programs of generated questions from "O" Level syllabus (with explanations).
EDUCATIONAL QUIZ: 4 (16K) programs on General Knowledge, Reasoning, English and Maths. All questions use RND function.
JUNIOR ENGLISH 1 (8-13 years): Meanings 1, Meanings 2 (harder), Parts of Speech, Proverbs, Similes, Anagrams.
JUNIOR ENGLISH 2: Idioms, Opposites 1, Opposites 3 (harder), Group Terms, Odd Word Out, Spellings.
£4.50 per cassette or send sae for catalogue to:- **ROSE CASSETTES,** 148 Widney Lane, Solihull, West Midlands B91 3LH.

ASTRO-INVADERS (16K)

Superior machine code programming, fast action space graphics, a new dimension in ZX-81 value:
* explosive on-screen kill effect
* high-scoring saucers
* 54 attacking aliens
* accelerating attack rate
* destructable defence shields
* continuous score and high-score

On cassette with four BONUS games; ARCADE GRAND-PRIX (machine code skill, 4 levels) PENALTY (get ready for Spain '82), GOLF (judge shot-stength, angles, bunkers . . . and maybe hole in one!), plus fun SWAT.

5 games on one cassette for only **£3.65** (post free). Order now from John Prince, 29 Brook Avenue, Levenshulme, Manchester, M.19.

ZX81 SOFTWARE

DATABASE
Amazingly versatile program allowing the creation of files of any description: anything from stock-control to employee records, and more. Features include add, delete, update, print, sum, count, average and security lock. Supplied with detailed documentation and tape contaiining two samples files. Excellent value at only £10.

BUDGET/ADDRESS-BOOK
BUDGET will record all your income/expenditure for home or office budgetting.
ADDRESS-BOOK maintains a list of names, addresses and telephone numbers. Uses machine code for fast access. Both programs for only £4.

Educational programs available, including WORDSTORE, QUIZPACK, FUNCTION PLOT, STATISTICS.

Send SAE for full details of these and other programs to

J PURVES
12 Stobhill Road, Gorebridge, Midlothian
EH23 4PL

ZX81 COMPUTER + 16K RAM in superb condition, all yours for only £100 o.n.o. Phone 01-462 1614 after 5pm.

ZX81 16K "RENUMBER". Renumber your program lines, including GOTO's and GOSUB's, using this general purpose utility routine. Recorded twice on high quality TDK AD-C46 cassette. £3.50 all inclusive. M.R. Irving, 22 Wheatley Way, Chalfont St Peter, Bucks SL9 0JE.

SPECTRUM – ZX81
BUSINESS GAMES

AUTOCHEF As MD you must negotiate for leases, decide on menu prices, level of wages, advertising and dividends and forecast levels of inflation. If you are not successful you will be made to resign!
AIRLINE You must decide on number of aircraft to operate, loan and fuel contracts, whether to buy or charter, and levels of staffing and maintenance.
Please specify computer when ordering.

Each program makes use of **HISTOGRAMS** and **BAR CHARTS** and uses 15K. £4.75 each or £8.00 for two.

C.C.S. 14 Langton Way, London SE3 7TL. Tel. 01-858 0763

ZUCKMAN (16K)

The first ZX81 version of Puckman
**** All Machine – code***
**** Trail, Energy Posts etc.***
**** On-screen score, high score***
**** Authentic action***
only £5.95 inc. P&P
Send cheque or P.O. to:
D. Looker, DJL Software,
9 Tweed Close, Swindon, Wilts.

ZX81 1K Sinclair built with large keyboard in case plus I/O port and various programs. £80. Bob Wilcock, 41 Berwick Road, Wood Green, London N22 (01) 889 3571.

QUALITY ZX81 SOFTWARE. 20 Superb IK Games (Inc. Machine Code), £2.75. 16K Utilities in Machine Code, £3.25. IK Utilities, £2.25. 16K Machine Code Editor for the Serious M.C. user, £3.50. B.RAO, 12 Parkstone Close, Bedford, Beds. Tel: (0234) 46248.

ZX81 COMPUTER, 16K RAM + QS prog., Graphic Generator and mother Board + £50 worth of software, inc. m/c invaders. **Worth over £220, will sell for £160.** Contact Banbury 54896 (After 5pm).

ZX81 16K almost new, DK 512 Programmed graphics + 512 user definable, KayDE keyboard. Books basic + machine code. Tapes Games - Invaders - Chess etc. Machine code Assembler/Disemblers. Total value £250+ selling £170. Dave Noonan 01-272 5674.

At last ZX81 PHEONIX in 16K. Expertly programmed and recorded. **Only £3.00,** cheques/PO payable to A.R. Hill, 29 Trimdon Ave., Acklam, Middlesbrough, Cleveland, TS5 8LU.

ZX81 16K ARCADE GAMES. M/C Missile Command and Galaxians £4.95. M/C Asteroids + Invaders £4.95. M/C Falklands Islands, action packed adventure at £4.95, all on cassette. Magnum computing, 3 Wensley Close, Harpenden, Herts.

WANTED. ZX80/81, Vic and Atom books. Half price for good condition. S.a.e. for buying/selling lists, or books direct to: Allan Guy, 24 Woodside Drive, Cottingley, Bingley BD16 1RF.

ZX81 +16K RAM Sinc. Built. Adaptor, Manual, **DK4K ROM** + literature. Software including **Chess, Startrek** and many more. **+ Prog. Book.** £120 o.n.o. the lot. v.g.c. Tel: **Wokingham 782947 after 6pm.**

ZX81 MEMOTECH 48K Module c/w PSU. Cost £140 **used once** only. Will accept £90 o.n.o. Phone Newdigate STD (030 677) 274 after 6pm.

ZX81 MICRO-COMPUTER with 16K RAM and £20 worth of software on magnetic tape with manual very good condition, hardly used. £85 o.n.o. Tel: Barnsley (0226) 42143 between 2.30pm to 8pm for further information.

FOR SALE – ZX80 8K ROM 16K RAM manuals. Many pre-recorded programs inc. Sinclair business/household, Chess, Labyrinth . . . all perfect working order. Accept £120 o.n.o. Tel: Northampton (0604) 831078.

ZX81 KITS. Cure Top Line Slant and Ram Pack Wobble £2.95. Inverse Video Module £2.95. Built £3.55. Repeat Key £3.75. Built £4.95. All Kits ex-stock. Please add 40p P/P.

ZX81 with 16K RAM. Also many programs £55. ZX80/81 40-key **Keyboard** £15. Both items in good order. Phone Atherton 879413 after 5pm.

FIVE ZX-81 graphics games – YAHTZEE, PONTOON, MOONLANDER, NINETYNINE, BLASTOUT. Tape £4.00, Listings £1.00 each. Many others available including SOCCERFILE. s.a.e. details Adrian Boone, 1 Church View, Tobermore, Magherafelt, Co. Derry.

"ZX81 64K *USEABLE* RAM, PIA, EPROM, professional keyboard and case (incl 6 spare keys and space bar). Programs + Books value £30+. Cost over £260. Sell for £200 o.n.o. Tel: (0642) 782719"

SINCLAIR ZX81 with Keyboard Bleeper, Sinclair 16K RAM pack manual and two books, and assorted micro computing magazines £100 o.n.o. Ring Stevenage 721659. (Herts.)

ZX81 STORE/SORT PROGRAMME (16K). Store, sort and order 100's of items of information and amend as required. Tape and instructions £4.95. J. Blackford, 63 Eltisley Avenue, Cambridge 3.

ZX81

16K PACK 123

Pack 1, 2 & 3 include all of:
AIR TRAFFIC CONTROL: Animated radar screen of busy airport shown. You must bring planes into land; INVADERS SELFPLAY; PHONEBOOK — keep friends' and relatives numbers on cassette. COMPUTER DATING, who will it pick for you and those around you for a laugh. ADVENTURE ATLANTIC: you may become very rich or marooned forever. BREAKOUT: SQUASH: LANGUAGE TRANSLATOR: translates any European language to any other. COMPUTAPUNT: predict horse races and football pools with you ZX. INDISCO, video roadracer. DRAUGHTS computer chequers, with kings. BATTLESHIPS, nautical naval battle at home. MASTERMIND: brain teaser, see if you can beat a microelectroic mind.
THIS MASSIVE PACK OF SOFTWARE IS ONLY **£5.00**

NEW ZX ADVENTURE

A brand new release, this package of adventures written in Basic and Machine Code are the best value and quality available. Just compare them with others!

1. GOLF: one or two players have a matchplay off with handicaps and progress around an 18-hole course which is superbly detailed with bunkers, lakes, trees, bushes and greens. We think you will agree this game has the best graphics available for the ZX81.

2. DAMSEL IN DISTRESS: you are the knight in shining armour, your quest is to ride to a vast castle and rescue your princess and release her from the clutches of an evil witch. You must dream up a spell to destroy the old witch and collect enough gold to bribe the guards. A very Bewitching Adventure program.

3. STORM THE TOWER: as the General of a medieval army you must deploy your arms and men so you can attack an enormous castle with a huge tower. You must build armaments and prepare for the correct hour to attack but beware of rearguard action and consider intelligence reports with care!

ADVENTURES £8.00

ZX BUSINESS SYSTEM

Now installed in many businesses, comes with PURCHASE, SALES LEDGER for 100+ entries per week, does daybook analysis, VAT incl. and excl., totals, password protection plus many more excellent features. You also get a STOCK CONTROL, MAIL LIST and PHONEBOOK. Easy to use, designed for everyday small businesses. Includes instruction book and tape. **£17.00 incl. VAT.**
And does the job of systems costing hundreds of pounds.

ZX AUTOCODER

Writing machine code?
Some love it, some hate it but AUTOCODER just gets on with it. Helping you produce machine code programs from BASIC. Easy to use and very helpful. Converts PRINT, PRINTAT, IF THEN, GOTO, GOSUB, LET INKEY$, POKE, PEEK, CLS, etc.

ALL £5.00 incl.

ZX ARCADE PACK

Machine Code Arcade Games for 16K RAM ZX81

These Classic Machine Code games come together for £5.00 on one tape.
We guarantee these are the Best Value & Best Quality you can get.

INCLUDES
UFO BOMBER, bombs, missiles, thrust up down two types of ALIEN.
GALAXIANS, incredible swooping and bombing enemy fighter.
SPACE INVADERS. No doubt the best version available, several Aliens, crumbling defences, wave after wave of excitement.

PLUS MANY MORE ALL ON ONE TAPE FOR £5.00

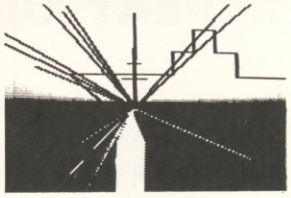
* If this pack is not the best you've ever had we will refund your £5.00.
* ALSO AT GOOD COMPUTER SHOPS!!

All prices incl. VATR and p&p. Please send to:
CONTROL TECHNOLOGY, 39 Gloucester Road, Gee Cross, Hyde, Cheshire SK14 5JG (061-368 7558).

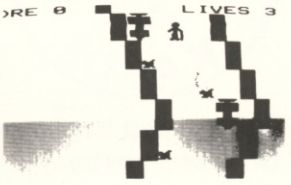
SUPER SOFTWARE
AVAILABLE FROM
CONTROL TECHNOLOGY

NEW RELEASE

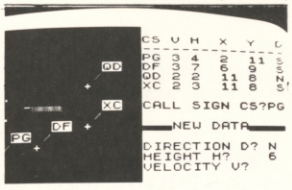
Trident (Acorn Atom)



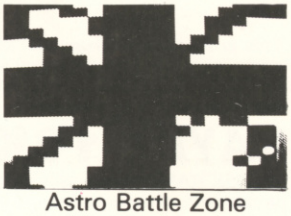
Death Race 2000 (Vic 20)



Air Traffic Control (ZX81)

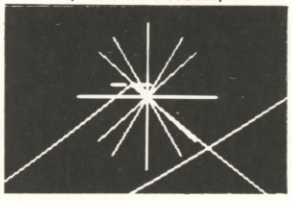


Warlords (Vic 20)

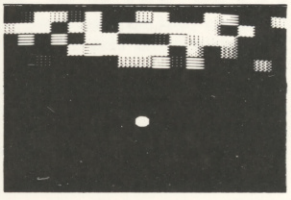


Moroids (Vic)

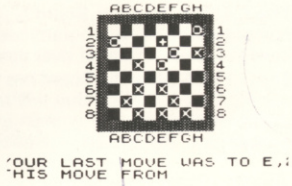
Astro Battle Zone (Acorn Atom)



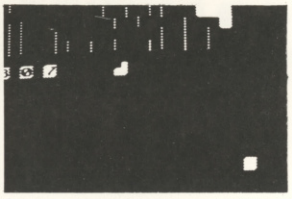
Breakout (Vic 20)



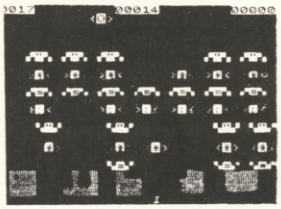
Draughts (ZX81)

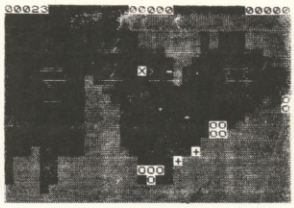


Maze of Death (ZX81)



Breakout (ZX81)





Please send me as soon as possible the following:
☐ _____ £_____
☐ _____ £_____
I enclose a Cheque/P.O. for the total £_____
NAME _____
ADDRESS _____
_____ POSTCODE _____

KAYDE Electronic Systems

ZX80/1
ZX KEYBOARD WITH REPEAT KEY

£37.95 inc VAT

Fully cased keyboard £37.95
Uncased keyboard £27.95
Keyboard Case £10.95

This is a highly professional keyboard using executive buttons as found on top quality computers. It has a repeat key and comes complete in its own luxury case. This is a genuine professional keyboard and should not be confused with toy keyboards currently available on the market.

KAYDE 16K RAM PACKS

£29.95 inc VAT

The 16K RAMPACK simply plugs straight into the user port at the rear of your computer. It is fully compatible with all accessories and needs no extra power and therefore it will run quite happily on your Sinclair power supply. It does not over-heat and will not lose memory at all. As you may know some makes go down to 11K after being on for a while.

This 16K RAMPACK is very stable and will not wobble or cause you to lose your programme. It comes fully built and tested with a complete money back Guarantee.

KAYDE FLEXIBLE RIBBON CONNECTOR

£12.95 inc VAT

Stops movement of RAM PACK and other accessories
(Not needed with a *KAYDE* RAMPACK)

KAYDE 4K GRAPHICS BOARD

£29.95 inc VAT

The *KAYDE* Graphics Board is probably our best accessory yet. It fits nearly inside your ZX81. It comes complete with a pre-programmed 2K Graphics ROM. This will give nearly 450 extra graphics and with there inverse makes a total of over nine hundred.

The *KAYDE* Graphics Board has facilities for either 2K or RAM (for user definable graphics) 4K of ROM or our 4K Tool Kit Chips that will be available shortly. All the graphics are completely software controlled, therefore they can be written into your programmes. Here are a few examples: **A full set of space invaders — Puckman — Bulits, Bombs — Tanks — Laser Bases and Alien Ships.**

NO EXTRA POWER NEEDED

KAYDE 16K GRAPHICS BOARD SOFTWARE

£5.95 EACH

Peckman: The only true ZX version of the popular arcade game.
Centipede: "In all I think this is the best presented moving graphic program I've yet seen" Phil Garratt, Interface.
Space Invaders: The best version available anywhere.
Graphic Software can only be used with a Graphics board.

KAYDE 16K 81 SOFTWARE

£5.95 EACH

Centepede "In all I think this is the best presented moving graphics program I've yet seen" Phil Garratt Interface.
3D/3D Labyrinth. A Cubit Maze that has corridors which may go left, right, up, down.
Peckmen (the latest addition in 81 games).

WHY WAIT TO PAY MORE
FAST IMMEDIATE DELIVERY

Post to:
Dept SU
Kayde Electronic Systems Ltd
The Conge
Great Yarmouth
Norfolk NR30 1PJ
Tel: 0493 57867 (Dept SU)

Don't Forget you can always order on the telephone with your credit card

All products include VAT are fully built and tested and come with a COMPLETE MONEY BACK GUARANTEE

Access

VISA

I enclose £.....
Name .....
Address .....
.....
.....

Please add £1.50 P/P for all hardware and 50p for all software.
Please make cheques payable to Kayde Electronic Systems Ltd.